12 New Education Reviews **New Horizons for GEOS**

The COMMODORE C-128/C-64 Home Computing Guide

RUN

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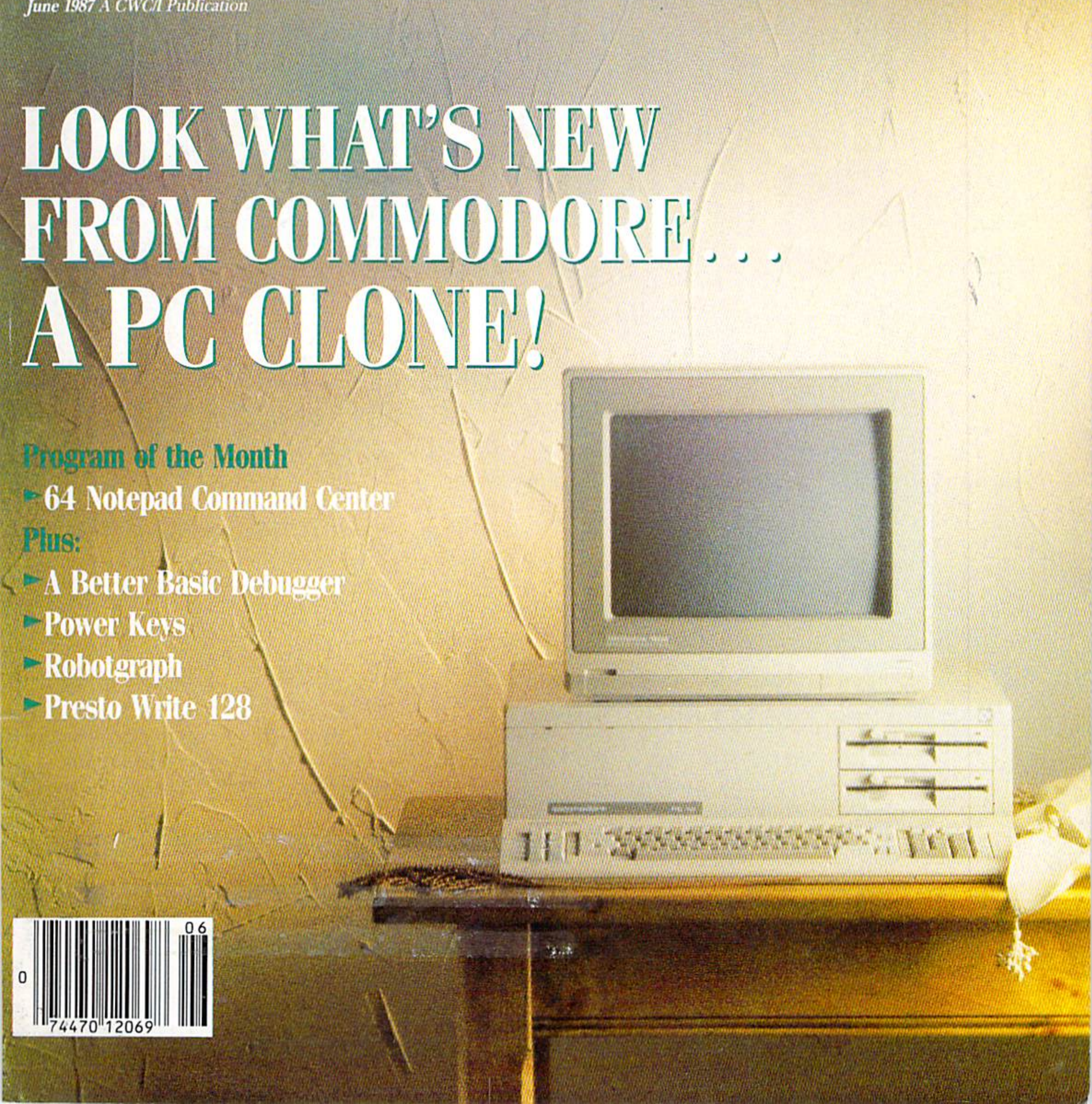
June 1987 A CWC/I Publication



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"A" Rating.
– Run Magazine, March, 1987.

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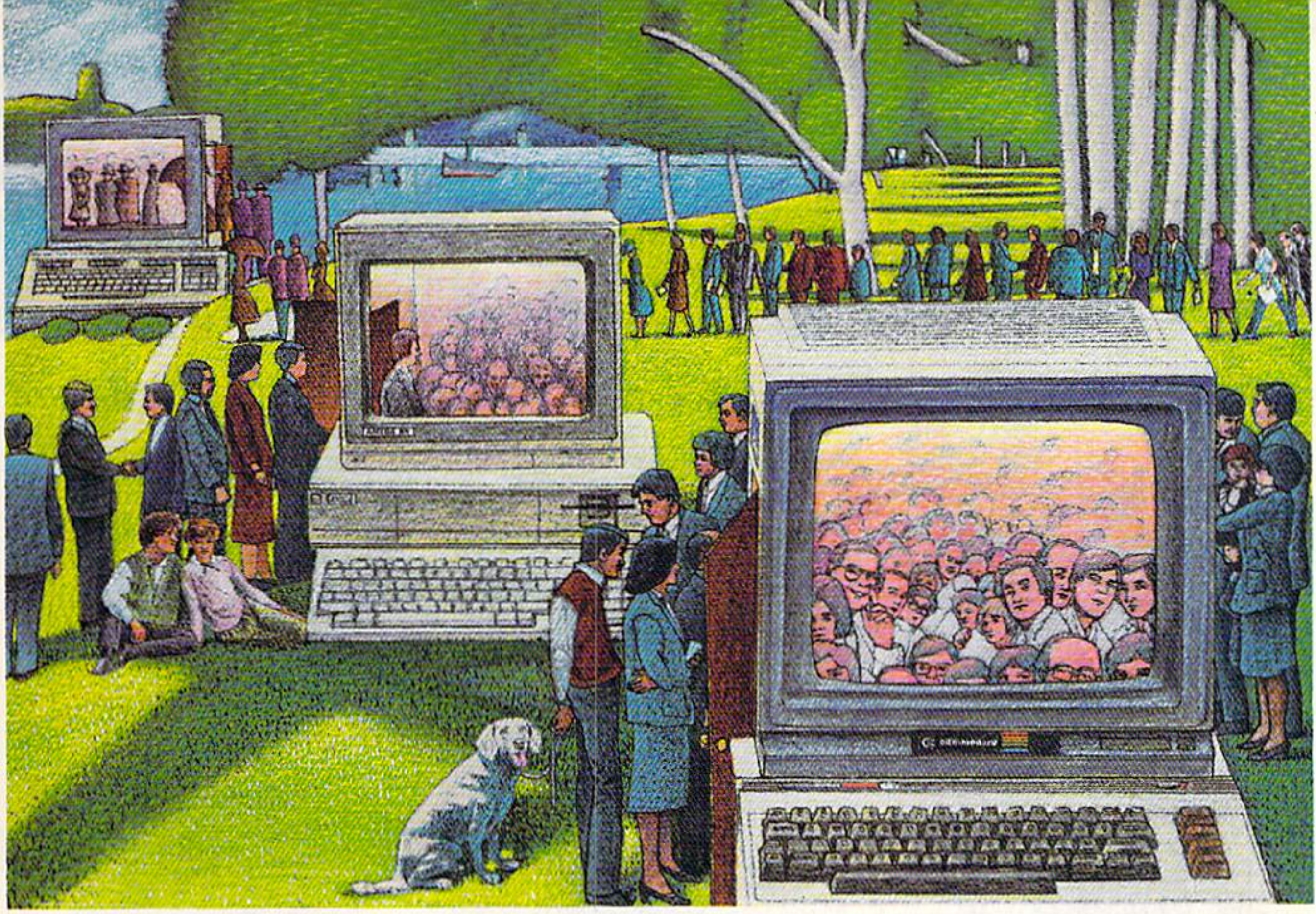

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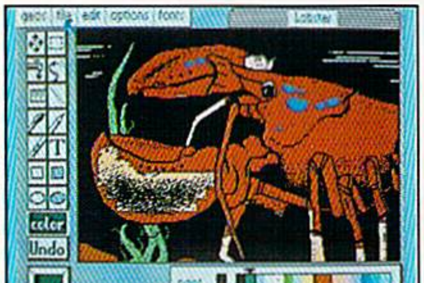
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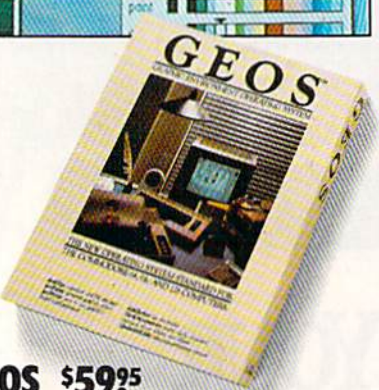

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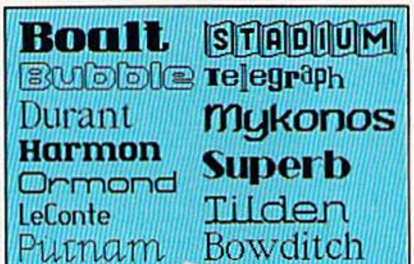

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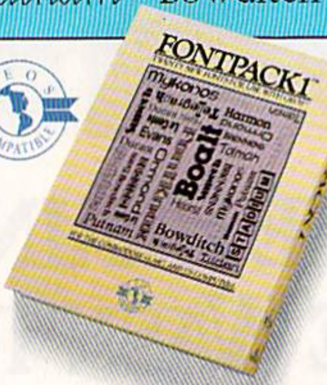

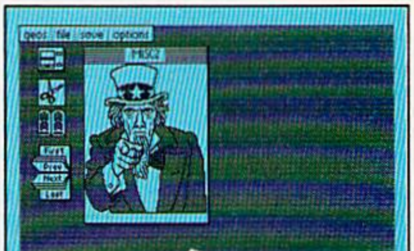
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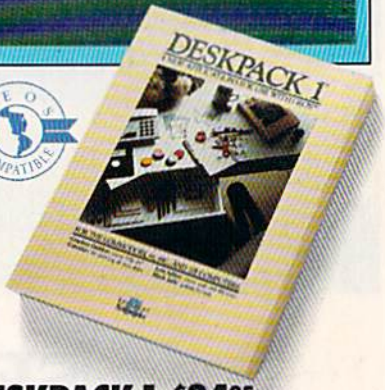

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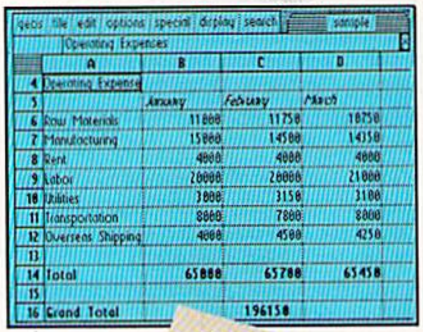
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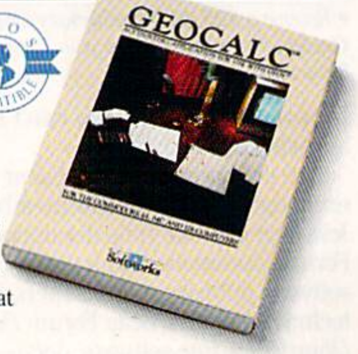
Operating Expences

	A	B	C	D
4	Operating Expense			
5		January	February	March
6	Raw Materials	11000	11750	10750
7	Manufacturing	15000	14500	14350
8	Rent	4000	4000	4000
9	Labor	20000	20000	21000
10	Utilities	3000	3150	3100
11	Transportation	8000	7800	8000
12	Overseas Shipping	4000	4500	4250
13				
14	Total	65000	65700	65450
15				
16	Grand Total		196150	



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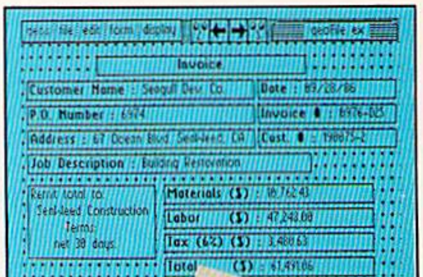
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Date : 09/28/86
P.O. Number : 6974
Invoice # : 6976-005
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Cust. # : 198875-2
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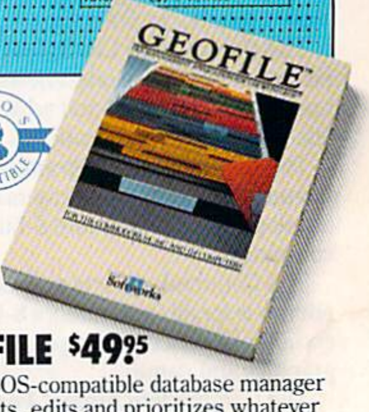
net 30 days
Materials ($) : 10,762.43
Labor ($) : 47,248.00
Tax (6%) ($) : 3,480.63
Total ($) : 61,491.06



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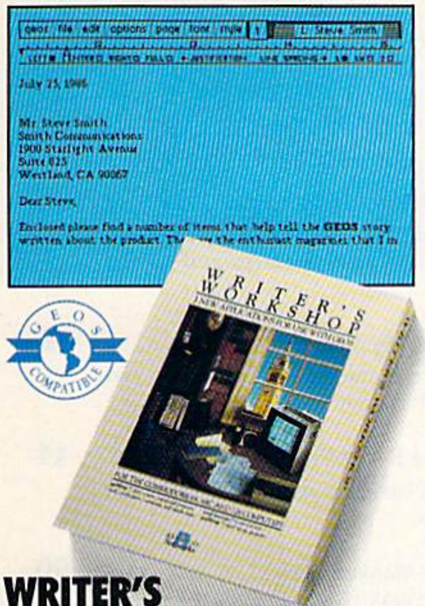

July 25, 1986

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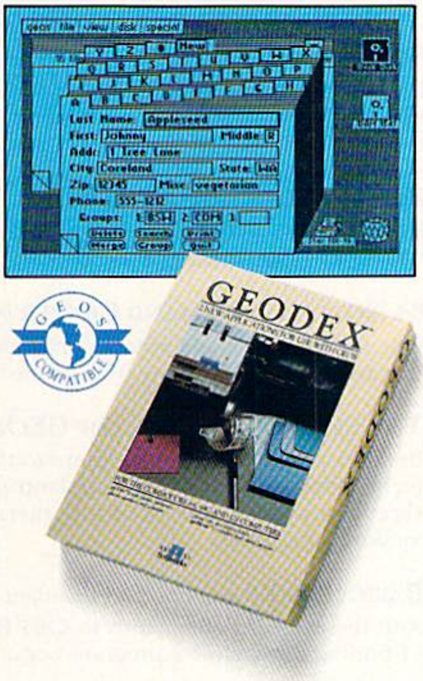

Last Name: Appleseed
First: Johnny Middle: R
Addr: 1 Tree Lane
City: Coreland State: WA
Zip: 12345 Misc: vegetarian
Phone: 555-1212
Groups: 1 BSH 2 CDH 3

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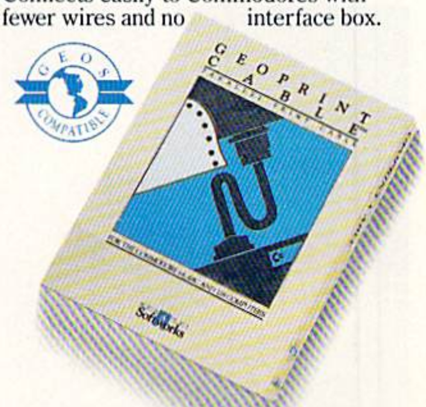

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Berkeley Softworks

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JUNE 1987
VOLUME 4, NUMBER 6

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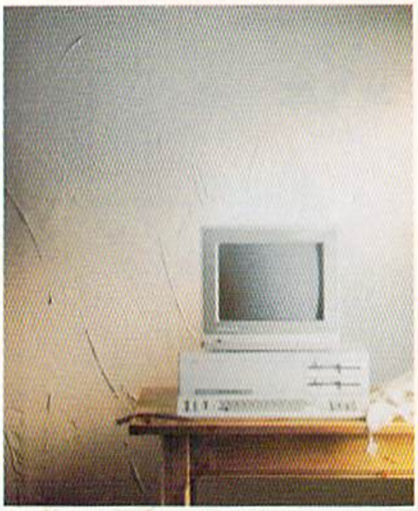

COVER PHOTOGRAPHED BY PAUL AVIS

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Launched successfully in Europe, Commodore's entry in the IBM clone sweepstakes has reached U.S. shores. Read about its features and how it compares with two strong competitors.

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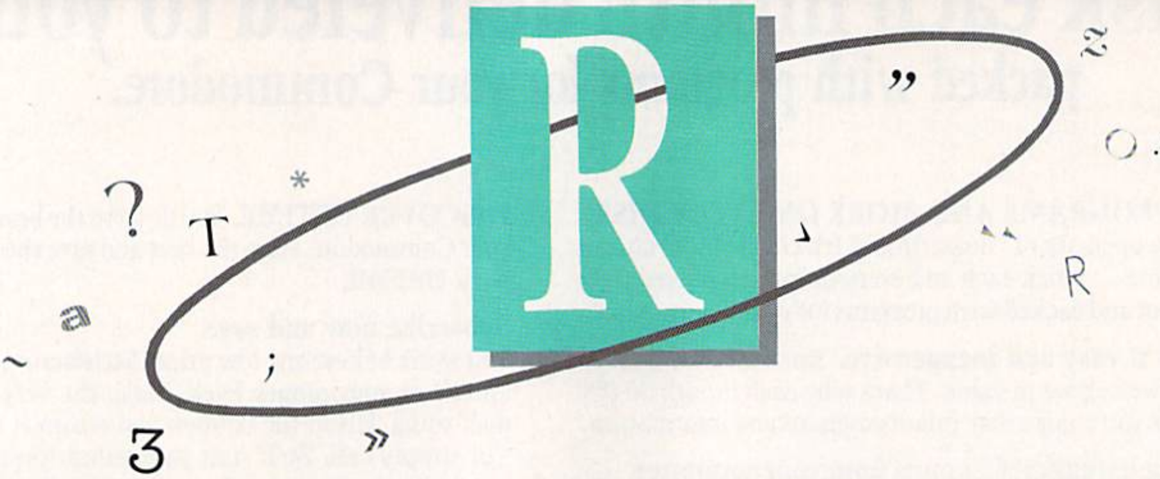

THE CLONE KILLER?

Commodore recently joined the ranks of U.S. PC-clone makers with the introduction of the PC10. Commodore's IBM-compatible makes its entry into the U.S. market after successful sales in Europe—particularly in West Germany. Industry pundits question Commodore's move to test this market, maintaining that the home-computer manufacturer is too late with its entrant to make any serious inroads against the bigger names.

According to Commodore officials, the company would have introduced the computer in the U.S. sooner if it hadn't been so popular in Europe. Nigel Shepherd, head of Commodore's North American operations, stated, "we have barely kept up with the demand for PCs in Europe. While that scenario existed, it didn't make a lot of sense for us to weaken the European situation by bringing the units into the United States."

Now, with additional manufacturing facilities in the Far East, Commodore is in a position to meet the demands of both Europe and the U.S.

This month's cover story looks at the PC10-2 IBM-XT-compatible machine, which boasts several standard features not found in other leading PC clones—graphics and color capability, two built-in disk drives, 614K RAM, five expansion slots and 100 percent IBM software compatibility. In addition, Commodore has existing service and support centers.

IS THE PC10 FOR YOU?

With manufacturing facilities already in place for this proven machine, Commodore is seeking to establish a profitable, although not overly ambitious, niche. Their goal in the U.S. is a relatively modest 60,000 to 100,000 units per year.

If you're a Commodore user who's looking to enter the world of MS-DOS, then you should give Commodore's offering a serious look. The PC10 is yet another option with many plusses you should consider. As our review this month states, "for those who are moving into the IBM-PC arena, Commodore's PC10-2 is certainly a strong contender."

As the authoritative voice in the Commodore market, we felt an obligation to offer an objective, one-time report on CBM's latest entry. It's a little disheartening to see more promotion and advertising for this PC clone than I've seen for the 64 or 128 in years. But Commodore's entry into the MS-DOS market does make good business sense.

Commodore's PC-clone notwithstanding, the main focus of Commodore, and *RUN*, will continue to be on the home computer market, which, of course, has been responsible for the success of the company.

ANOTHER "IMPORT"

Later this year, you can expect another introduction from Commodore, which will be covered in *RUN*. This other "import" from Europe is the 128D, which, like the PC-10s, is very popular in Europe.

Commodore is gearing up for an introduction of this machine before the CES in Chicago next month. With its built-in 5¼-inch disk drive and power supply, the 128D should be a popular model among the space-conscious computer users. What makes it all the more attractive is that it loses none of its compatibility with the existing C-128.

Now that it has received FCC certification, the 128D will enter the U.S. market with about a $550 price tag, as reported in a previous issue of this magazine.

OTHER JUNE HIGHLIGHTS

This month, *RUN* offers a special look at education software that parents, teachers and students can use in the classroom or at home. Software Gallery reviews eight of the latest educational releases—from simple spelling and counting programs to Activision's new Term Paper Writer. This month's Resource Center examines three gradebook programs that help teachers calculate grade averages, prepare reports and manage the classroom.

Also in this issue, we are pleased to present an article about how Commodores are making a profound difference in the lives of the disabled. Written by Kent Patterson, himself disabled, the article illustrates the potential for voice-controlled C-64s to help the disabled perform such chores as writing, answering the phone and controlling lights and other appliances.

Do you know how to prevent computer failure and what to do if your system does fail? In this issue we offer some practical tips on the care of your computer system. You'll learn the proper techniques to prolong the life of your Commodore and, also, what to do in the event that your Commodore acts up.

On the GEOS front, we present the latest offerings from Berkeley Softworks, including reviews of geoDex and Writer's Workshop, as well as a preview of a C-128 GEOS version.

Programs featured in this month's issue include "Basic Bug Trap," which will help programmers track down bugs in their programs. "64 Notepad Command Center" is an enhancement that makes 64 Notepad easier than ever to use.

"Power Key" lets you easily enter Basic commands by assigning special values to function keys, and "Robotgraph" is an education application that teaches young computerists about bar graphs.

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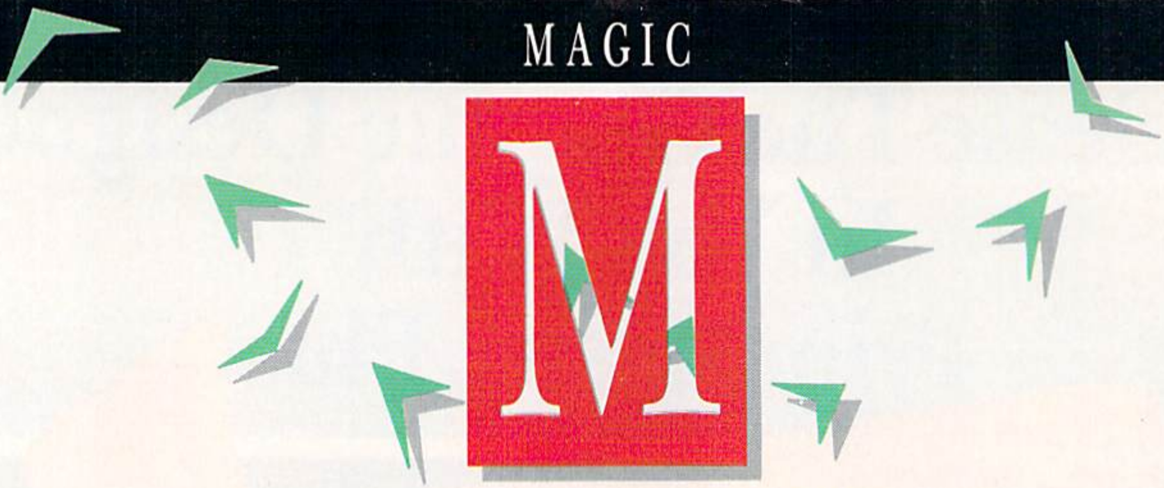

Print out hard copies from within the C-128's monitor; add a bi-directional printing effect to your screen titles; add a pause feature to your Fastload directories; tune your guitar; address business-size envelopes; and more.

By JIM BORDEN

Magic is the original *column of reader-submitted hints and tips. Each month we present brief, useful computer "tricks" to help you get the most out of your Commodore system—whether you're a beginning or advanced computerist, a C-64 or C-128 owner. Magic is a forum for* RUN*'s imaginative and inventive readers to share their programming tips, brief software or hardware modifications, shortcuts or items of general interest. If you have an idea to make computing easier, faster, more exciting and enjoyable, send it to:*

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RUN *pays $10 to $40 for each trick published in the column. A payment of $50 and a Magic Contributor T-shirt is awarded for the Trick of the Month. To be eligible, the Trick of the Month must be for the C-64 or the C-64 and C-128. Tricks for C-128 mode only are not eligible for Trick of the Month.*

If you'd like a copy of the latest edition of RUN*'s Magic Trick Writer's Guide, send your request with a self-addressed, stamped envelope; you'll receive a copy in two or three weeks.*

$3E7 Shortest file-reader—Here's a one-liner for reading sequential files. It should work with any Commodore computer. In the line below, change "filename" to the name of your sequential file and type in RUN. It will open the file, display its contents on the screen and close the file when finished.

```
1 REM FILE READER-R. W. BENJAMIN
2 OPEN8,8,8,"FILENAME":FORI=0TO1:GET#8,A$:
  I=ST:PRINTA$;:NEXT:CLOSE8:END
```

Robert W. Benjamin
Wysox, PA

$3E8 128 instant directory display—I have a way to instantly call up a directory display without interrupting any work I'm doing in 64 mode. Before going to 64 mode, I load the disk directory I'll be working with to the 128's 80-column screen. When I need to view the directory, I simply switch my monitor to 80-Column mode.

Al Blakey
Barre, VT

Trick of the Month

$3E9 Help-file reader—In order to print a help screen within a program I was writing, I needed a routine like C-128 GETspeed (Magic trick $378, *RUN*, December 1986), but altered so it wouldn't interfere with the program in memory. I also had to relocate the code so I could use cassette or disk. I chose $1300 (decimal 4864) as the starting location and made these changes to the original program:

```
10 REM HELP FILES-RICHARD HERRMANN
20 FORI=4864TO4918:READT:POKEI,T:CK=CK+T:N
   EXT
30 IFCK<>7665THENPRINT"ERROR":END
40 DATA 160,0,185,64,19,240,3,200
50 DATA 208,248,152,162,64,160,19,32
60 DATA 189,255,169,5,168,162,8,32
70 DATA 186,255,32,192,255,162,5,32
80 DATA 198,255,32,207,255,32,210,255
90 DATA 32,183,255,240,245,32,204,255
100 DATA 169,5,32,195,255,96,00
19999 END
20000 FOR I=1TOLEN(H$):POKE 4927+I,ASC(MID
      $(H$,I,1)):NEXT
20010 POKE 4927+I,0:SYS4864:GETKEY K$:RETU
      RN
20020 REM END FILENAME:CALL ML:WAIT FOR KE
      YPRESS
```

The subroutine at 20000 pokes the filename into memory for the machine language code. Of course, you must run lines 20–100 above before accessing the File Reader subroutine. An example of how to use the program, assuming that you name your help file Helpfile, is shown below:

```
1000 GETKEY Q$:IF Q$ = "{CTRL H}" THEN
     H$ = "HELPFILE":GOSUB20000
```

I hope other readers find this trick as useful as I have.

Richard Herrmann
Brookhaven, NY

$3EA Customized DOS Wedge for your C-64—Here's a way to customize the DOS 5.1 Basic loader. Save the follow-

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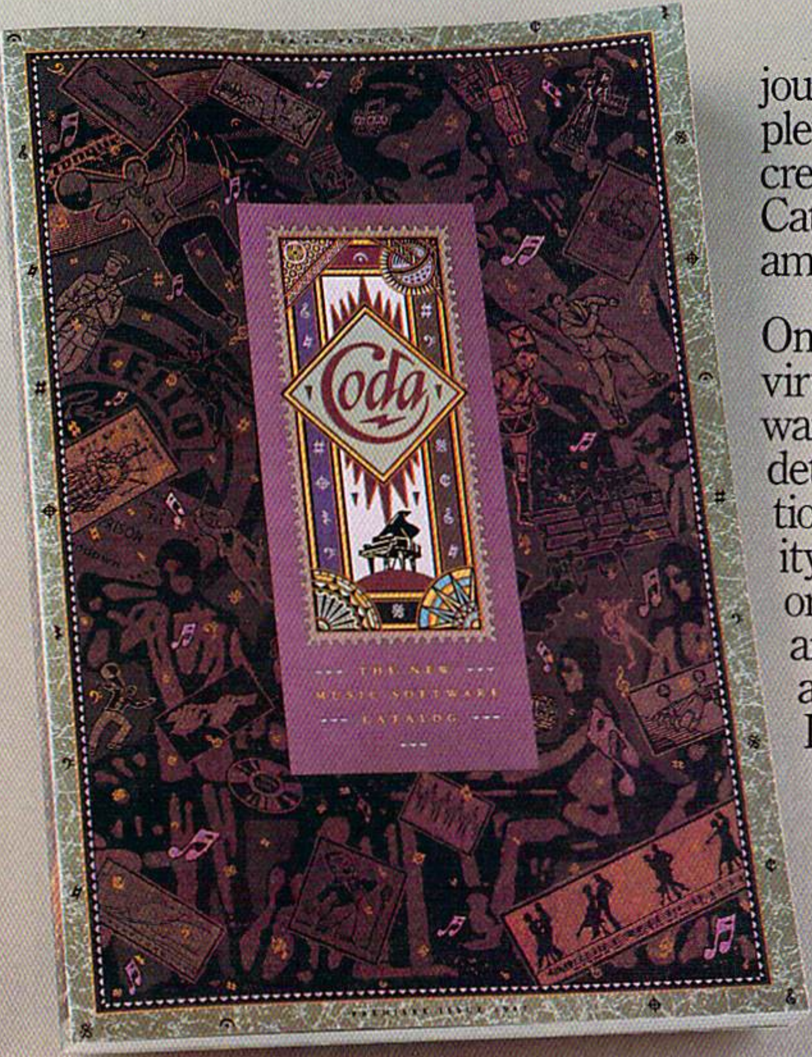

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Magic

ing program with the filename "!"; be sure the DOS 5.1 ML program is also added to your disk.

```
0 REM DOS LOADER+ BY KARL JOHNSON
10 IFA=0THENA=1:LOAD"DOS 5.1",8,1
20 OPEN1,8,15:PRINT#1,"M-W"CHR$(106)CHR$(0
   )CHR$(1)CHR$(133):CLOSE1
30 FORJ=679TO688:READK:POKEJ,K:NEXT:POKE77
   4,167:POKE775,2
40 SYS 52224:PRINT"{SHFT CLR}{CTRL 2}"
50 POKE53280,12:POKE53281,0:FORJ=631TO634:
   READK:POKEJ,K:NEXT:POKE198,4:NEW
60 DATA 72,173,141,2,208,251,104,76,26,167
   ,177,36,48,13
```

Then load and run the program (see p. 28 of the February 1986 *RUN* for a summary of the DOS Wedge commands).

Now you're ready to perform some time-saving magic. Type in this line:

```
L{SHFT O} "!",8:{SHFT RUN-STOP}
```

Like magic, the Wedge and Pause features are loaded and ready to use.

The program also lists the disk's directory so that you can run any Basic program by moving the cursor up to the filename, typing an up arrow and pressing return. Line 20 reduces the head-knocking caused by some copy-protection schemes. You can freeze a scrolling screen with either the control, Commodore, shift or shift-lock key. Release the key when you're ready to continue.

Karl Johnson
Houston, TX

$3EB More automatic Auto Menu

$3EB More automatic Auto Menu—Those of you who use Auto Menu (*RUN*, April 1986) to load and run your programs might want to make it self-running by modifying it with the Auto-Run program (*RUN*, January 1986). By making Auto Menu a self-running program, you need only enter LOAD"AUTO MENU",8,1. The program will then run itself and allow you to load and run other programs with a single keystroke.

Eddie L. Phipps
Moore, OK

$3EC Monitor hearing aid

For about $15, you can add sound to your video-only monitor with an audio cable plug, a Radio Shack amplifier-speaker (part #277-1008B) and an adapter (part #274-330).

Nelson Hamblin
Edgar, NE

$3ED Easy C-128 temporary saves

When you're typing in program listings, it's a good idea to save the program lines to disk every 15 minutes or so. I like the way Perfect Typist saves programs for me by adding this line to it:

```
9 KEY1,"SC{SHFT R}" + CHR$(34) + "Z" + CHR$(34) + ":D{SHFT
  S}" + CHR$(34) + "Z" + CHR$(13)
```

When you press F1, answer the prompt with a Y and press return. Perfect Typist will replace the old version of the program with the new version and the filename Z. After you've typed in the program, use the Rename command to change the program's name to one that's more descriptive.

If you'd like to make the scratch automatic, use the following line instead:

```
9 KEY1,"SC{SHFT R}" + CHR$(34) + "Z" + CHR$(34) + CHR$(13) +
  "Y" + CHR$(13) + ":D{SHFT S}" + CHR$(34) + "Z" + CHR$(13)
```

MSgt John R. Stevenson
APO New York, NY

$3EE C-128 ML monitor hard copy

The *C-128 System Guide* doesn't outline a method for printing hard copies from the built-in monitor. Use the following steps to get a printout.

First list the machine language program you want to print out and note the sections you want to disassemble or dump as memory. Exit the monitor with the X key, then type in OPEN 4,4:CMD 4,"";:MONITOR. Send the sections, along with the starting and ending addresses, to the printer by typing in D for Disassembly or M for Memory Dump. After all sections are listed, exit the monitor and type PRINT#4:CLOSE4 to restore the screen as the output device.

If your video monitor or TV is the 40-column-only type, the memory dumps will only print eight bytes per line to the screen and printer. You can use ESC X to switch to 80-Column mode and type the memory dump addresses without seeing what you type. This will print 16 bytes per line on the printer. Be careful typing, since you can't see the 80-column text with a 40-column-only video monitor.

Frank Harbin
Mobile, AL

$3EF Bi-directional screen printer

My bi-directional printing program adds a special touch of magic to your screen titles. You can also use this technique to enhance game scenarios, help messages, even menus.

You can vary the printing speeds by increasing or decreasing the time delay loops in lines 120 and 150, respectively. This program should work on any Commodore computer with a 40-column monitor. If you use 80 columns, change 40 to 80 in line 180.

```
10 REM SCREEN TITLES - SUSAN CHARNETSKI
20 RVS=1:PRINT"{SHFT CLR}{8 CRSR DNs}"
30 A$="*{3 SPACEs}* ***** ***** * *****":G
   OSUB100
40 A$="** ** *{3 SPACEs}* *{5 SPACEs}* *{4
    SPACEs}":GOSUB130
50 A$="* * * ***** *{2 SPACEs}** * *{4 SPA
   CEs}":GOSUB100
60 A$="*{3 SPACEs}* *{3 SPACEs}* *{3 SPACE
   s}* * *{4 SPACEs}":GOSUB130
70 A$="*{3 SPACEs}* *{3 SPACEs}* ***** * *
   ****":GOSUB100
80 A$=" BY SUSAN CHARNETSKI "
90 RVS=0:PRINT:GOSUB130:END
100 GOSUB180:GOSUB160:FORLR=1TON
110 PRINTTAB(LR+X)MID$(A$,LR,1);
120 FORTD=1TO30:NEXT:NEXT:PRINT:RETURN
130 GOSUB180:FORRL=NTO1STEP-1:GOSUB160
140 PRINTTAB(RL+X)MID$(A$,RL,1);"{CRSR UP}
    "
150 FORTD=1TO25:NEXT:NEXT:PRINT:RETURN
160 IFRVS=1THENPRINT"{CTRL 9}";
170 RETURN
180 N=LEN(A$):X=(40-N)/2-1:RETURN
```

Susan M. Charnetski
Plains, PA

Continued on p. 88.

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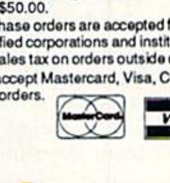

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Compiled By BETH S. JALA

Editor's Note: This month's Software Gallery is dedicated solely to education. We've tried to cover the basics—reading, writing and arithmetic—and all the age groups, from kindergarten through college.

Arithmetician

B-

A Variation on Beat the Clock—Beat the Cartoon!

Chapter One of the small documentation booklet for this arithmetic practice disk consists of a confident admonition to try the program without first reading the instructions. I did, and discovered that the menus and screen directions are, indeed, sufficient.

You are entertained during Arithmetician's rather lengthy loading process by an image of a castle on a rocky hill silhouetted against a moonlit sky. A melody, recognizable as the main theme from Tschaikovsky's Swan Lake, accompanies this scene as clouds gather, obscuring the moon. Lightning flashes, thunder rumbles, bats fly, and the picture disappears. You are then asked to type your name, for the program keeps score. Pressing the return key produces the first menu.

The program, which deals only with integers, offers you six problem types: addition, subtraction, multiplication, division, a combination of addition and subtraction and a combination of multiplication and division. Your choice of keys 1–6 is followed by a second menu, from which you select the level of difficulty (1–4).

The range of difficulty is extreme, from the simplest addition or subtraction of one-digit numbers to long division of a four-digit into a seven-digit number, with remainder. Although the easiest level is appropriate for first grade, a child really must be able to read the screen directions in order to handle the program without help.

Operation is fairly simple. You type in a digit, or perhaps a minus sign where needed, at the blinking cursor, which guides you in entering your answers or steps thereto. This is fine, once you get used to the right-to-left movement of the cursor. In written addition, subtraction and multiplication, you ordinarily do work from right to left. In computing mentally, however, you think, "3 times 4 equals 12," and your impulse is to write down 1, then 2. But if you type it this way, it will appear as 21—wrong!

In division, it's even trickier, since you enter the answer from left to right, and must therefore consciously move the cursor each time to the right until it's in the proper position. Unless you're an unusually calm person, this cursor manipulation can be annoying, and can even produce anxiety if you're worried about your score, which you can see rapidly decreasing as time passes. The accompanying cartoon that emphasizes your dropping score not only doesn't help, but tends to interfere with concentration.

Problems are grouped in sets of eight. After a set is completed, your score is displayed, along with a cartoon and one of a number of classical melodies that many users will find familiar. When you have finished a problem, you press the F7 key, whereupon a flashing screen indicates a correct answer, or flashing red squares show you the incorrect digits in your work or answer.

Arithmetician is in no way a tutorial; its value lies in the considerable variety of problems it presents as material for honing your computational skills through practice. I don't regard it as suitable for young children, but for remedial work or general practice for ages of about nine on up, it can surely be helpful.

The scoring devices add spice for those who enjoy competition, either against others or themselves, and the cartoons and the most unusual music dress the program up nicely. On the whole, Arithmetician scores quite well in answering the need for practice in the four fundamental processes with whole numbers. *(tensoft, PO Box 86971, San Diego, CA 92138. C-64/$24.95 disk.)*

Swain Pratt
***RUN* staff**

Report Card

A	***Superb!*** An exceptional program that outshines all others.
B	***Good.*** One of the better programs available in its category. A worthy addition to your software library.
C	***Average.*** Lives up to its billing. No major hassles, headaches or disappointments here.
D	***Poor.*** This program has some problems. There are better on the market.
E	***Failure.*** Many problems; should be deep-sixed!

Buzzword

B-

Words, Words, Words—Guess Them if You Can!

Buzzword is an interesting educational program in the pretext of a game. It is a nicely set up, well-written combi-

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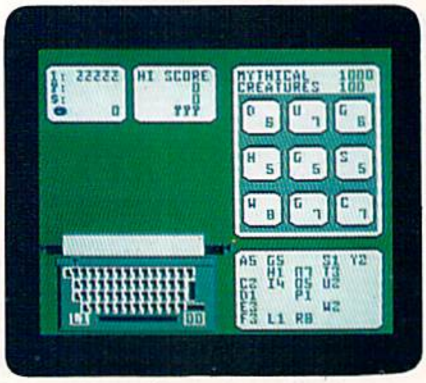
nation of trivia, hangman and Scrabble.

The documentation states that Buzzword is for ages nine and older, and as a game, it can provide hours of entertainment for trivia fans who enjoy expanding their vocabulary.

Buzzword comes with "cheat sheet" cards to explain each category and to let you learn which words will work. The game has 32 levels of play, including some two-player, interactive parts. There are three difficulty levels and 200 subjects to choose from. The graphics are fairly good, and I found the screen easy to understand.



Vocabulary is the game, Buzzword is the name.

One of the drawbacks I noticed, however, was that after playing a number of times, you could memorize many of the answers (which the documentation freely admits). The game timer can also be a problem: I am a fairly good typist, but I had trouble typing in answers fast enough to beat the clock. This is frustrating, and I expect that children will have trouble with the time factor.

As a piece of educational software, Buzzword is usable, but may be a bit too hard for someone without a massive vocabulary. I have an above average vocabulary, and found many of the cards beyond my ability to solve. One in particular, Evil Beasties, covers an area in which I am rather expert, due to years of research for role-playing games. I had a lot of trouble with this, and on the easiest level of difficulty, lost the round. I suspect that younger children would quickly become defeated by the words in the game. The difficulty range is broad enough so that almost any player will be challenged, but perhaps it lacks enough easy plays for school-age children.

I think that Buzzword might be considered as a diversion for reading classes, especially those for gifted students. In the home, the program may disappoint parent and child alike. *(The Buzzword Game Company, Inc., PO Box 440747, Aurora, CO 80044. C-64/$39.95 disk.)*

Mike Hinshaw
Tulsa, OK

MacBeth

B

A Twist on a Classic Produces an Educational Adventure

Avalon Hill's MacBeth turns one of Shakespeare's most famous plays into a series of four computer adventures. A contemporary twist to the program gives the user four psychoanalytic sessions, with an astute medieval incarnation of Sigmund Freud, known as the Bard. He provides insight into the personalities of both the murderous Scotsman and his wife.

Besides the two program disks, MacBeth comes with a manual and a small paperback book containing the first version of this tragedy, published in 1623. You won't need to pull out your Cliff or Monarch notes: Over one-half of this book includes helpful background information. It has a section on the historical MacBeth, an Elizabethan perspective on the play, a synopsis of the play, a family tree, a map, a glossary, an excellent bibliography and other useful details. You'll need to refer to the text often in order to be successful.

In the first episode, you are MacBeth, and you must prove yourself superior, in both combat and wit, to a gamut of adversaries like an axe-wielding horseman and the merciless and nearly indestructible Macdonwald. You are provided with numerous written clues, including a newspaper, which you would be wise to take along for future reference, as its stories have a habit of changing from time to time.

In the second adventure, you assume the role of the scheming Lady MacBeth. King Duncan and his retinue will soon arrive at Cawdor Castle, and you must quickly feed them and put them at ease. You have only one night to incite your reluctant husband into killing the king. To do this, you must map out 38 locations in the castle, find four herbs, use them, and provide MacBeth with the great amount of tactical and (im)moral support he needs to carry out his task.

The third adventure makes the greatest use of graphics. You must help the witches prepare their spell by finding the ten ingredients for their cauldron. Clues are given in the form of riddles and changes in the graphics. They aren't simple, and it's not always clear what each object you see really is. In order to move and use the objects shown, you'll need to familiarize yourself with a number of medieval Scottish words.

In the last adventure, you assume the role of King MacBeth under siege at Dunsinane Castle. In contrast to the original play, your MacBeth is not necessarily doomed. You must be clever enough, however, to outwit the author himself, who takes the form of a "Shakespeare-master," and who is fast enough to avoid the enraged MacDuff and his invading troops.

The parser recognizes more complicated sentences than other adventure games I've played, and it reacts very quickly to those commands it will accept. When a word is not understood, it reappears in red, but unfortunately, no glossary of acceptable commands is provided. Sometimes, you can get a useful clue by typing help. Acceptable sentence syntax and vocabulary vary from one adventure to the next.

Relive the tragedy of MacBeth on your computer screen.

There are several improvements that could be made to this program. First, the text of the play is written in such tiny print that it's difficult to read without a magnifying glass. Second, both the instruction booklet and the program refer to the scenes of the play in absolute sequence as scenes 1–31, while the text uses both act and scene. One system would make referencing the text much easier.

A third improvement would be to print the scene number at the top of each page of text. Finally, a glossary of the commands accepted in each episode would be a real help.

The sound effects I encountered are about average for adventure games. The Scottish bagpipe songs—Amazing Grace and Loch Lomand are both heard—are multi-voiced and better than average. The many screen graphics used are directly related to the action in the story. They often contain rudimentary anima-

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tion, and could best be described as medium, rather than high, in resolution.

MacBeth is an extremely challenging game: To succeed in any of the adventures, you must read and understand the text and the personalities of MacBeth, his wife and the other characters. Like Shakespeare's play of over 350 years ago, it is clever and entertaining. As with other adventure games, I found it more fun when played with a friend.

I believe that MacBeth could be used in the classroom, but would strongly suggest that this be done only after you are thoroughly familiar with the program and have made a list of acceptable commands. Most adventure game buffs will find it well worth the price. One thing seems certain: Anyone whose alter-ego MacBeth survives will know the play at least as well as any Shakespearean scholar. *(Avalon Hill Game Company, 4517 Harford Road, Baltimore, MD 21214. C-64/ $25 disk.)*

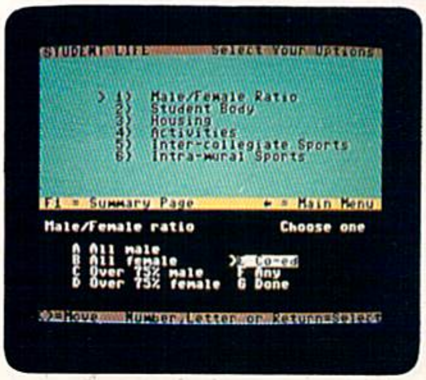
Richard Eldridge
Miami, FL

The Perfect College

Wish I May, Wish I Might, Find the College That's Just Right!

A-

If you're a student, parent or guidance counselor, Mindscape's The Perfect College will be a great help to you in considering all 1657 four-year, accredited, degree-granting U.S. colleges and universities. The package consists of the college selection program, a database of about 440,000 facts, a 19-page booklet and a quick reference card.



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STUDENT LIFE             Select Your Options

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    C Over 75% male       F Any
    D Over 75% female     G Done

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Your first step is to set up a "wish list" of up to 26 criteria desired in a future college—cost, subjects available, size, location, type of student body, competitiveness and student/faculty ratio. Selection is very easy because the cursor keys, joystick or keyboard numbers are used, and there is an on-screen display to access previous screens and menus.

Next, you save the Search option file to disk. This file is originally set by default to include every institution in the database and can be reset at any time. The last file changed can even be restored after a reset, so obviously much thought was given to taking advantage of the C-64's file capabilities. I experienced no difficulty in saving or restoring, even after multiple saves and resets.

Once you have saved the search options, you may begin the actual search. While you do this, a count of the number of institutions compared is given, and soon you are provided with two lists of institutions: An "A" list, containing each institution that fits all your criteria, and a "B" list, with those that fit all but one or two of the choices given. Five screens of data on each institution on either list are then available for viewing or printing out.

Six categories of institutions are included in the database: liberal arts colleges, universities with graduate schools, technical schools, art schools, business colleges and upper-level colleges designed for students with a junior or community college degree.

The Perfect College can create a list of any desired combination of criteria. Among the 26 available are the minimum SAT and ACT scores and acceptable high school gradepoint averages. Also mentioned are honors, remedial, and other special programs, as well as varsity and intramural sports played, and the type of academic calendar used. The fifth screen gives the address and telephone number and a summary of the overall nature of each institution named.

Application deadlines are listed to facilitate getting scores and records in on time. Mindscape plans to update the program each year, so it is likely that the information it provides will be more current than possibly outdated college catalogs in libraries and counselors' offices.

The documentation is clearly written and easy to use. It explains the abbreviations used, gives details on each of the options and provides good advice on how to maximize the chances of being accepted.

The few drawbacks of this program are mostly due to disk space limitations. The page containing addresses, phone numbers and summaries is on side two of the disk. Although a message tells you to turn over the disk whenever data on the opposite side is required, this disk-flipping can be annoying.

Considering the high cost of college, I feel that information on financial aid would be very useful. Finally, of course, all programs or books on the subject of higher education ultimately depend on information provided by the schools themselves. Whenever possible, a chat with current students or recent graduates is always a good idea.

The Perfect College represents a very good value for prospective students, and could be a real boon to guidance counselors because each student can be given a handy printout. Mindscape is also offering The Perfect College with its SAT tutoring program, The Perfect Score, in a $49.95 package, which seems an especially good bargain. *(Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062. C-64/ $19.95 disk.)*

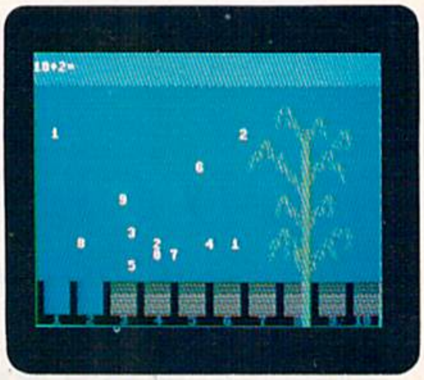
Richard Eldridge
Miami, FL

Fish-Ed

A-

Hey Kids! Let's Go Fishing for the Answer!

Most young children enjoy learning about spelling and counting, but who would have thought that they could go fishing while they learn?



Go fishing for the answers with Fish-Ed.

Fish-Ed is a delightful program for kindergarten through sixth grade students. It employs high-resolution graphics, sprites and quality Commodore sound.

There are four different games on the program disk, each set in a colorful, undersea world. Choosing from Alphabet Practice, Spelling, Number Concepts and Math, children must manipulate a control fish through the water, collect letters, numbers or little guppies, and drop them into bins on the ocean floor.

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But watch out, matey! There's a tricky old fisherman in his dinghy on the water's surface, and he's fishing for you! He has a net, so you must keep a sharp eye above while going about your undersea lessons.

Alphabet Practice is designed to teach correct alphabetical order. By using a joystick or the keyboard, you move the fish around the screen, grabbing each letter in the fish's jaws and dropping it into the proper bin below.

You are never punished for incorrect responses in this well-designed, educational game. When you answer correctly, however, the screen shakes, fireworks flash, and sirens, music and whistles sound: Fish-Ed leaves no doubt when you're doing fine!

You can adjust the speed of each game. You can even turn off the fisherman's net-throwing ability, which may be a good idea for the younger learner.

In the Spelling option, a word is briefly displayed on the screen. You then move the fish around, snagging letters in his mouth, to spell the word correctly. Spelling has six word libraries from which to choose—one in RAM and five more on disk. You can also create and save to disk your own word libraries, with up to 20 words in each.

Game three, Number Concepts, teaches the quantitative meaning of addition and subtraction. A simple problem is displayed at the top of the screen—for example, "3 + 2 = ?"—and is pictorially represented by fish in bins on the ocean floor. You answer correctly by filling the answer bin with the right number of guppies.

Fish-Ed's Math module—clearly the most advanced—provides practice in addition, subtraction, multiplication, division, fractions, decimals and problems with multiple operations. Again, you may use one of seven resident problem sets or convert each night's homework problems into a customized library.

The product is advertised for ages 5–11, but I created a fraction library in the Math module that kept me quite busy at maximum fish speed. Oh, how much more enjoyable my multiplication tables would have been with Fish-Ed!

Although it is true that hand-eye coordination varies greatly from child to child, Fish-Ed might have offered easier keyboard control of the fish. The four keys used—1, 2, control and ←, moving up, forward, backward and down, respectively—aren't the best possible choices. Four keys arranged in the typical diamond shape would have been preferable (I, J, K and M, for example).

Parents of pre-schoolers should be warned that joystick operation, even at slower speeds, could be tricky for this group.

Fish-Ed is a solid educational tool for parents and teachers alike. Menu selections are made with single keystrokes, as are most game commands, letting young children play independently. Operator errors are well-trapped and error messages are accurate and easy to understand.

A brief, but thorough, manual describes each game, the special keys and some optional activities. There are also some interesting hints for parents and teachers on how to make best use of the product.

If you're looking for a sensibly priced, positive learning experience for your early learner, try Fish-Ed. But watch out for the net! *(Buchanan Software, 160A North Fairview Ave., Suite 146, Goleta, CA 93117. C-64/$29.95 disk.)*

Ken Silverstein
Raymond, NH

HomeWork

B

Seek and You Shall Find That the Answer Is On Page . . . . . .

HomeWork is a terrific idea. Employed properly, it can enhance many school-aged children's homework and studying skills. The program can be used by any number of children, so it's suitable for either home or school.

Each HomeWork disk has a corresponding school textbook. My review copy, apparently designed for middle school or junior high, was D. C. Heath's *Life Science*. The documentation mentions available math and social studies texts, as well as science.

Operating the program is simple, because the disk's database is linked to numbered study questions in the book. The student enters the page number, the question number, and, for those pages that have more than one set of questions, an occurrence number. HomeWork scans its database and provides the page, column and paragraph that contains the answer.

In all programs except math, HomeWork includes a password system for parents. When the password is activated, the screen indicating the page location of the answer also gives the correct answer or the first few words of the sentence containing the answer. This password is enclosed in a sealed envelope marked for the parents' attention only. The correct answer is given to students after they've entered three wrong answers.

In general, HomeWork is easy to use, well conceived and well executed. The graphics aren't particularly eye-catching, but screens are attractive and readable. Students aren't given a free ride: They have to look up answers and read the book, and math pupils get help before they become too frustrated.

I did have a few problems with HomeWork, however. One annoying fact is that you can't correct mistakes on the question screen—the delete key doesn't work. When I absentmindedly entered the question number instead of the page number, I had no choice but to cycle through to the database search. The screen told me, "Naughty, naughty, naughty. There are no questions on page 1." Perhaps younger children will giggle at this treatment, but I wasn't amused, and I don't think junior high schoolers would be, either.

It's more than likely that children will hit the wrong keys from time to time. Pro Comp should correct this design error and permit use of the delete key to correct mistakes. Some children may cease to use the program if this problem becomes too frustrating. Also, there were a few times when I caught HomeWork giving me the wrong reading locations. It had the right page, but the wrong paragraph. As for documentation, it's adequate for adults, but needs more examples for children.

If students are prevented from cherry-picking assignment answers and from using the Password mode, HomeWork is an excellent tool. In addition to leading students to the answers, it also trains them in study techniques that will serve them well when they graduate to school levels for which HomeWork disks aren't available. *(Pro Comp, PO Box 891, Dalton, GA. C-64/$24.95 disk.)*

Annette Hinshaw
Tulsa, OK

Term Paper Writer

B+

Major Reports Are not so Overwhelming— Once You're Organized!

Term Paper Writer is for anyone who has ever spread a stack of index cards over a desk to try to put them in reasonable order. The concept behind this software is that information need only be entered once—as you do the research or from library notes and thoughts scribbled on the back of your hand.

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While it won't do your research for you, Term Paper Writer makes it easier to turn a collection of facts into a well-organized document. Limited to approximately 50 notecards and 20 pages of text, this package should be able to handle most of a high school or college student's writing chores.

Before you can begin, you'll need to prepare a special work disk for each project. It takes a few minutes for your 1571 drive to format both sides of a disk and create several files to store data.

The main menu offers four functions. Notetaker lets you enter information in much the same way as you'd fill out an index card. You are first prompted to designate the type of source, then enter the names of the author and publisher and the other details that will be recalled when Term Paper Writer creates your bibliography and footnotes. Your notes are typed in next, followed by a key year and up to four key words.

While I appreciated the ease with which data could be entered, I wasn't prepared for two minor inconveniences encountered while using the Notetaker function. Due to the unique manner in which Term Paper Writer organizes its files, there was a wait each time a source or note was written to disk: 25 seconds seems like forever when facts are flowing from your fingertips.

Even more annoying was the discovery that the 80-column side of Notetaker uses a combination of screen colors that could not be read on my monochrome monitor. Rebooting the program and switching the monitor cable to 40 columns provided a legible screen. None of the other modules had this problem and the remainder of my work was done on the C-128s 80-column screen.

You'll probably spend most of your time in the Outliner and Writer sections. Outliner lets you list up to 99 ideas, and when you want to group and edit them, the Features menu gives you access to standard functions like block move, copy, delete and restore.

Once your list is organized, the tab key turns it into an outline that contains up to four levels. Term Paper Writer automatically indents as it inserts standard Roman numeral headings and Arabic letter and number subheadings.

Term Paper Writer lets you switch directly from the word processing screen to the outline. One of the nicest features of this program is its ability to import text from either the outline or the note cards.

The powerful Search function makes it possible to quickly check each note card for whatever data you're looking for. Notes and quotes can be lifted directly from the card and inserted in your document. Unfortunately, the notes are neither flagged nor deleted, raising the possibility of using the same information twice or leaving out an important detail.

Term Paper Writer is well-designed, thoroughly documented and quite easy to use. However, the program totally ignores the cardinal rule of computing—back up your data. I feel that even the novice computerist should be able to back up a data disk, especially one as important as a term paper. *(Activision, Inc., 2350 Bayshore Parkway, Mountain View, CA 94043. C-128/$49.95 disk.)*

John Premack
Lexington, MA

Maxi Math

B

Attention All Math Students: This Program + Your C-64 = High-Level Calculation!

From counting squares to calculating monthly loan payments cuts a broad swath in the field of elementary arithmetic operations, but this is just what Maxi Math does. It consists of four programs on one disk, and offers a wealth of practice from kindergarten to high school level. Unfortunately, there is little tutorial help beyond a few brief definitions and explanations.

Upon loading the first program, M1, you are presented with a menu—called an index—so extensive that it requires two screens. Several counting and adding games are followed by eight groups of addition exercises, from single digits up through summing four three-digit numbers. Subtraction follows a similar progression, but there is less of it.

Then comes multiplication, with the tables up through 12, practice with the tables and several groups of problems that culminate in multiplying two three-digit numbers. Division in this first program only goes as far as short division with three-digit dividends and a remainder. The program ends with problems that can be run out on a printer for practice on paper. Good idea—lest we forget completely how to write?

The presentation is straightforward and the operation simple, with few quirks. To give some flavor, if you choose a counting game and activate it by pressing the return key, you see, for example, three squares, a plus sign, two more squares and then an equals sign, all in a row. You answer by typing, hopefully, 5 and pressing the return key. RIGHT! appears on the screen, and the next example is automatically displayed. If you enter an incorrect answer, you're told it's wrong and the problem is repeated. There is no scoring, and hence no timing, which I like: Far better for children not to be pressed for time when doing math.

The second program, M2, plunges you into that old bugaboo, long division. You are asked to do the second, more difficult group of problems on paper and type in only the answer. This is excellent review if you're rusty, for long division also involves, of course, multiplication and subtraction. The rest of this second program is devoted to fractions. If division didn't get you, fractions will!

In the section on fractions, the program enunciates some rules—not very clearly in a few places. For example: "To reduce to lowest terms, find the largest number that will go into both numbers of the fraction and divide."

In spite of faltering English, there is plenty of good practice in fractions here. All four processes are covered reasonably well, except for one sentence attempting to explain so-called cancellation: "When multiplying fractions and the numerator of one fraction is divided by the same number that is divided into the denominator of the other fraction, this reduces the problem fractions to lower terms and does not change the final answer."

Program M3 deals almost exclusively with decimals, covering the material quite thoroughly. My only reservation here is that the beginner's section makes no attempt to explain place values; it only shows examples and how you read them. M3 also deals briefly with installment purchases, loans and investment returns, all of which are covered, more thoroughly, in M4.

The final program opens with a calculator that handles the four basic processes, power, square root and pi. Again, this program is less than explicit. I had to discover by experimentation guided by a guess that you square a number by entering ↑2. As mentioned above, this program offers several routines for calculating installment purchases and loans, investment returns and commissions. These are neither very flexible nor sophisticated, but are useful within their limits.

I'd rate Maxi Math as clearly worthwhile for the purpose of arithmetic review and practice. I'd not recommend it as a primary teaching instrument, but it should serve splendidly as a supplementary tool. It certainly covers a lot of territory. *(Maxi Math Educational Computing, 6317 S. Chenot Drive, Amarillo, TX 79109. C-64/$29.95 disk.)*

Swain Pratt
***RUN* staff** ■

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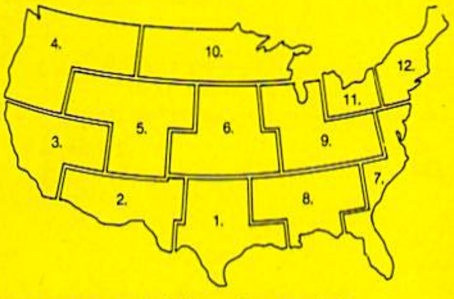

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commodore
PC 10

THE PC10 HAS LANDED

Launched in Europe, Commodore's IBM clone has arrived on U.S. shores and should be a strong contender in the U.S. market.

By MARGARET MORABITO

Commodore recently introduced its IBM-PC clones, the PC10-1 and PC10-2, to the U.S. consumer market after several years of selling very strongly in Europe. The clone market is currently packed with low-cost machines, but Commodore's introduction still comes at a good time. Commodore is already closely associated with the home market, it has a large base of service and support centers in place, and it has a strong product line at affordable prices.

Both configurations of the PC10 are compatible with both the IBM-PC and the IBM-XT. The PC10-1 is a single-disk-drive unit with 512K of memory, expandable to 640K on the motherboard or with a card. The PC10-2 is a double-disk-drive machine that comes with 640K. Aside from the number of drives and amount of memory, the computers are identical. I reviewed the PC10-2 for this article.

What You Get

The PC10-2 includes a system unit and an external keyboard. The system unit houses two half-height 360K floppy-disk drives, a floppy-disk controller on the motherboard, 640K of RAM memory, 16K of Phoenix BIOS, a Centronics parallel port for hooking up a parallel printer, an RS-232C port for a modem or serial printer, provision for polyphonic sound and an ATI Graphics Solution video display card.

The computer is equipped with a 112-watt power supply and a cooling fan. The power supply is strong enough to support a maximum configuration of two floppy drives, five expansion cards and a 40-megabyte hard-disk drive. The cooling fan is reasonably quiet; I've heard both louder and softer.

Commodore doesn't provide just the hardware; you also get the MS-DOS 3.2 operating system on disk, along with one volume containing the *MS-DOS 3.2 Operations Guide, MS-DOS 3.2 User's Guide* and *MS-DOS 3.2 User's Reference Manual.* In addition, you get GW Basic 3.2 on disk and a copy of Borland International's famous desktop organizer program, Sidekick, both also with user's guides.

Furthermore, the PC10-2 comes with a 12-month warranty and is supported by Commodore's large network of authorized service dealers. Commodore is marketing this machine in computer stores and selected retail outlets, not in the mass merchandising stores. You can get the location and phone number of your regional distributor by calling 1-800-345-8112.

The Microprocessor

The PC10-2 is built around the 8088 micropro-

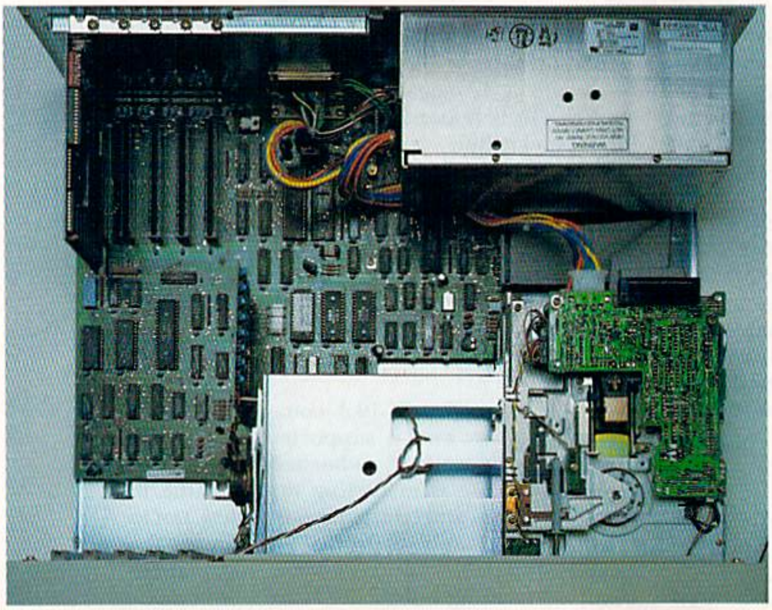
PHOTOGRAPHED BY LARRY DUNN

cessor (4.77 MHz), the original IBM-PC and XT chip. The 8088 is considered slow and outdated by some critics, but it's 100 percent compatible with all IBM-PC and XT software and is still being used by some other major clone producers.

Commodore's new IBM-PC clone, the recently imported PC-10.

Many clone manufacturers are speeding up their PCs by relying on multi-speed microprocessors that will run at 6, 8 and even 12 MHz. Tandy and Leading Edge, for example, have switched to the dual-speed 8088-2 chip, which will operate at 4.77 and 7.16 MHz. The faster processors make for faster handling of large amounts of data, as in large-scale spreadsheets and databases that require a lot of numeric input.

Microprocessor speed is not important to all users. If you're using your computer mainly for word processing, education and entertainment, or for applications that don't require a lot of number crunching, then you'll notice little difference between the 4.77 and 7.16 processing rates. However, for the business user who works with large spreadsheets, speed is an important factor.



A view of the inner workings of the PC-10.

For math-intensive applications, the PC10-2 has a socket on the motherboard that accepts an 8087 math coprocessor. This device speeds up operations involving floating point numbers and can be purchased at computer stores or from mail order firms for about $110.

Video Options

You have to pay big bucks to get graphics and color cards for an IBM-PC. Commodore, on the other hand, has included the ATI Graphics Solution card in the PC10-2. It provides the combined functions of the IBM CGA (Color/Graphics Adapter), the IBM MDA (Monochrome/Display Adapter), the Hercules Graphics Card and the Plantronics ColorPlus Adapter.

The ATI video card supports various monitors: IBM-compatible TTL monochromes, RGBIs such as the 1901 and 1902, color composites and monochrome composites. It also lets the PC10-2 run color software on a monochrome monitor using different shades, and it can handle a 132-column text display in Color and Monochrome modes.

This card offers three graphics modes: 320-by-200 pixels with 4 or 16 colors; 640-by-200 pixels with 2, 4 or 16 colors; and 720-by-348 pixels with Hercules compatibility. All this means that the PC10-2 can run any MS-DOS or PC-DOS software package.

You control the configuration of the Video mode through DIP switches on the ATI card and the motherboard, or through software. Be sure to read the instructions carefully when first setting up your system. If you don't set the switches properly, you won't get any display at all.

I used the 1902A RGBI color monitor for this review. While it did display all the software I tested, and produced good quality color graphics, I found it hard on my eyes for word processing. I've used other PC clones with much sharper text displays. Part of the problem is that only the contrast and brightness controls are active on the 1902A monitor; the sharpness, color and hue controls are not.

External Features

The lightweight PC10-2 keyboard is attached to the front of the system unit, which is convenient for holding the keyboard in your lap. There are 85 keys, including a numeric keypad and ten function keys, and they're arranged much as the IBM-PC's, with the ten function keys to the left and the numeric keypad to the right. The enter and shift keys are large, and the number-lock and caps-lock keys have LEDs. I like the feel of the PC10 keys; they're firm, but not clackety like those on the IBM-PC.

The system unit itself appears rugged and built to last. It's on the large side (19.25 × 15.5 × 5.5 inches) and made of metal. The cover attaches by screws to the back and sides of the unit, and the power switch is located on the back. Unlike some PC clones, however, there's no reset switch.

Setting Up

The PC10-2 is easy to set up. All you need are two electrical outlets—one for the system unit and one for a monitor. If you're using a color monitor, you have to set the DIP switches on the video card and the motherboard. Aside from that, the unit comes ready to use.

I had trouble attaching my RGB connector to the video port because of the high mounting location on the card. There's just a hair of space left between the top side of the cable connector and the system unit frame.

For those of you who are using a monochrome monitor, an RCA adapter is provided with the computer.

Software Compatibility

As with other IBM-PC clones on the market today, the PC10-2 is totally compatible with existing software for the IBM-PC. I tested my review unit with a variety of commercial IBM programs, such as Flight Simulator, Microsoft's Word 3.1, PC Tools, Graph-in-a-Box, SideKick, several Electronic Arts games, Accolade's Mean 18 golf simulation and Lotus 1-2-3. All worked flawlessly.

PC10-1 and PC10-2 Competitors and Comparisons

Taking the perspective of a potential buyer, I was concerned mainly with the features and the quality of the PC10. However, I was cost-conscious, too. The suggested retail prices are $1199 for the PC10-2 and $999 for the PC10-1 (monitor not included), and you can find these machines for less at local computer stores.

The prices of quality one-drive competitors to the PC10-1 are constantly dropping; in fact, systems with similar features are available at this writing for as low as $599. Many consumers are purchasing a one-drive unit, then buying a second disk drive (for about $130), a strategy that can be more cost-effective than buying a two-drive system.

When it comes to features, both the PC10-1 and PC10-2 stand up well in comparison to the leading clones selling for around $1000 and under.

Two of the PC10-1's major competitors are the Tandy 1000 EX and the Blue Chip. Feature by feature, the PC10-1 is way ahead of the 1000 EX, primarily because of its 512K memory and its five full-sized expansion slots. The 1000 EX comes with only 256K and three non-standard expansion slots. The PC10-1 also offers a more versatile video card, and, in general, a more IBM-like configuration than the 1000 EX, although for a greater price.

The PC10-1 and the Blue Chip appear to be about equal, but there are subtle differences. In the Blue Chip's favor, it has one more open expansion slot and a smaller footprint. However, it comes with just a monochrome video card, rather than the PC10-1's ATI graphics adapter. Blue Chip also has far less to offer in the way of manufacturer service and support.

Two of the PC10-2's most visible competitors for the home and school markets are the Leading Edge Model D and the Tandy 1000 SX. This Tandy, at $999, sells for less than the PC10-2, and it has one more open expansion slot in its basic configuration. The 1000 SX also comes with two joystick ports, a dual-speed microprocessor and integrated software, and it's backed by a huge support group for service and training. These factors make it seem perhaps a better buy than the PC10-2.

In the PC10-2's favor, however, is its 640K, as opposed to the Tandy's 384K (Tandy owners would pay about $100 more to get to 640K). The PC10-2 also offers a better video display, the standard IBM-PC keyboard arrangement and support for a 40-megabyte hard drive, and it comes with a full-year warranty.

The Leading Edge Model D provides more competition for the PC10-2. It offers the same number of open expansion slots in its basic con-

Table 1. *Comparative features of the PC10-1 and two of its leading competitors.*

	PC10-1	**Tandy 1000 EX**	**Blue Chip**
Price	$999	$599	$599
Memory	512K	256K	512K
Ports Included	Parallel RS-232 Video*	Parallel Joystick (2) Video Head phone jack	Parallel RS-232 Video*
Expansion Slots	5	3 (non-standard)	6
Disk Drives	1	1	1
Speed	4.77 MHz	4.77 MHz 7.16 MHz	4.77 MHz
Keys	85	90	84
Software Included	MS-DOS 3.2 GW Basic SideKick	MS-DOS 3.2 GW Basic DeskMate II	MS-DOS 3.2 GW Basic
Warranty	12 mo.	3 mo.	12 mo.
Peripherals Included	none	none	none

—On a card

Table 2. *Comparative features of the PC10-2 and two of its leading competitors.*

	PC10-2	**Tandy 1000 SX**	**Leading Edge Model D**
Price	$1199	$999	$1295
Memory	640K	384K	512K
Ports Included	Parallel RS-232 Video*	Parallel Joystick (2) Video Light Pen Audio	Parallel RS-232 Video
Expansion Slots	5	5	4
Disk Drives	2	2	2
Speed	4.77 MHz	4.77 MHz 7.16 MHz	4.77 MHz 7.16 MHz
Keys	85	90	83
Software Included	MS-DOS 3.2 GW Basic SideKick	MS-DOS 3.2 GW Basic DeskMate II	MS-DOS 3.1 GW Basic Leading Edge W.P. with Spelling
Warranty	12 mo.	3 mo.	15 mo.
Peripherals Included	none	none	Hi-res monochrome monitor

—ATI Graphics Solution card

For those who are moving into the IBM-PC arena, Commodore's PC10-2 is certainly a strong contender.

figuration, plus a dual-speed 8088-2 microprocessor, memory expansion to 768K on the motherboard, a 15-month warranty, a smaller footprint and a high-resolution monochrome monitor—all for only $95 more than the price of the Commodore machine. Of course, it comes with less memory than the PC10-2's 640K and doesn't support color graphics.

In Tables 1 and 2, you'll find summaries of these comparisons between the PC10s and their competitors.

Keep in mind that these comparisons highlight only a few of the dozens of machines contending in the huge PC clone market, and that my comments aren't meant as recommendations. I just want to suggest factors you should consider when you're clone shopping, as well as the kind of cost variance you're likely to encounter.

As you shop, you may find even lower prices than the ones I've quoted, as well as additional features. Clones are now coming out with more plusses, such as applications software, video monitors and built-in hard disk drives. Clone-hunting is a challenging job!

Summary

If you're considering an IBM clone, don't make its cost your primary concern. Other features are more important, such as what peripherals and software come with the system, the kind of keyboard it has, the engineering of the unit. You should also weigh its video and graphics capabilities, the size of the memory and provision for expansion, the speed of the microprocessor and options to add other floppy drives or a hard disk drive.

You also need to consider your reasons for buying an IBM-PC clone in the first place. If you're a home user, you may not need as hefty and versatile a system as a school user. As a business user, you'll need durability plus fast processing speeds and a large-capacity hard drive.

For those who are moving into the IBM-PC arena, Commodore's PC10-2 is certainly a strong contender. The hardware seems well built, it offers the same standard features as many clones, it provides room for a hard disk drive, it comes with bundled software to get you going, and it's supported by a major player in the personal computer industry.

To make the PC10-2 even more competitive for the home market, Commodore should drop the price, upgrade the microprocessor and include a video monitor. Then it should give the machine the promotional effort it deserves.■

Margaret Morabito, a freelance writer on computer topics, is associate editor of RUN *and author of the Resource Center column. You can write to her c/o* RUN *Magazine, 80 Elm St., Peterborough, NH 03458.*

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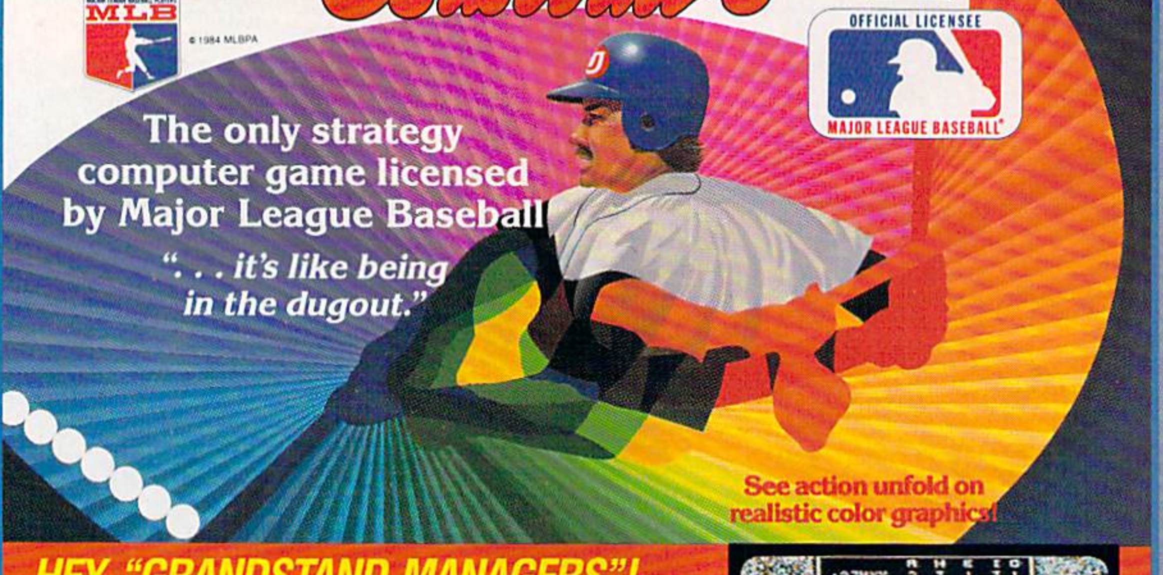

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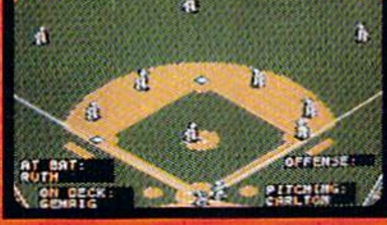

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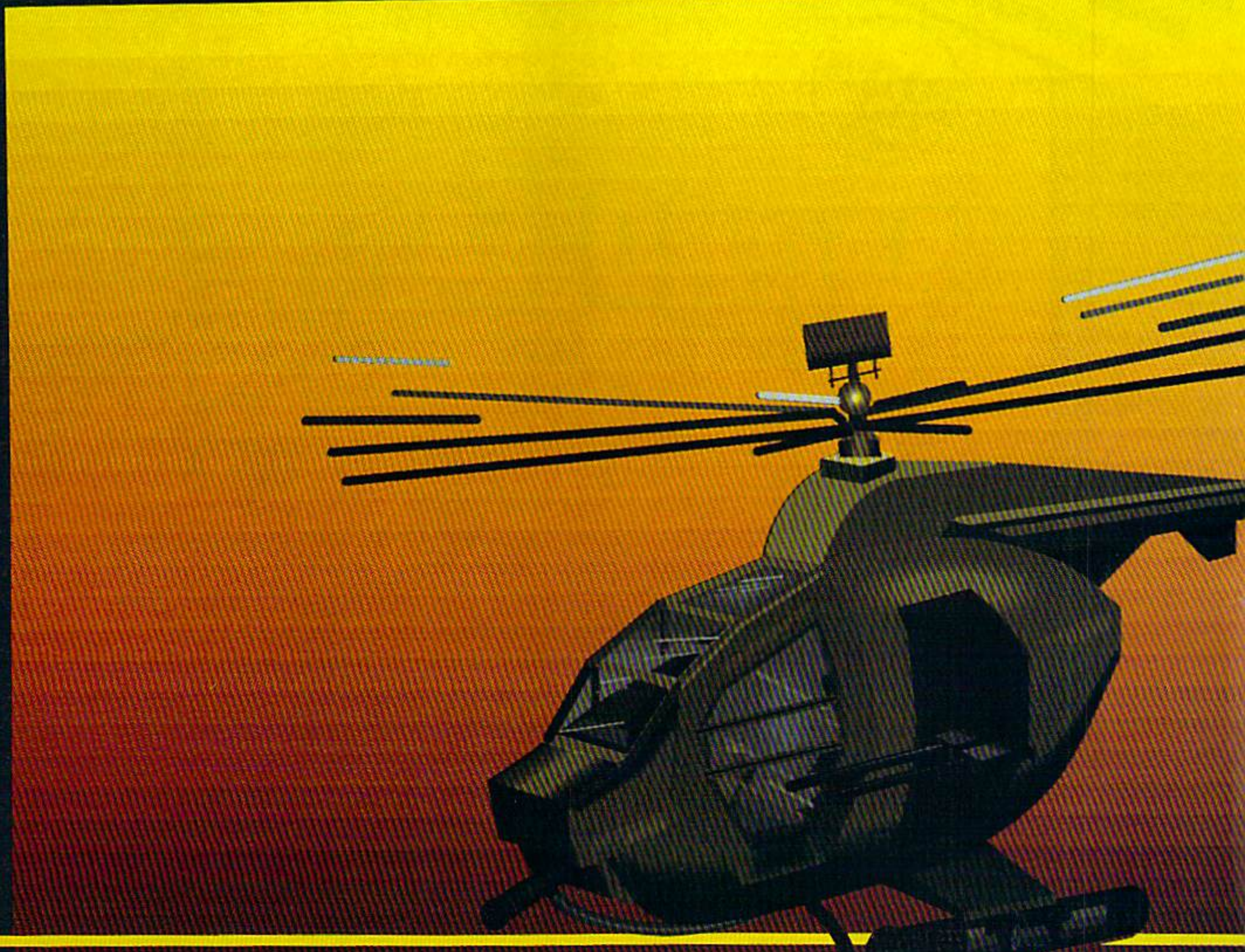

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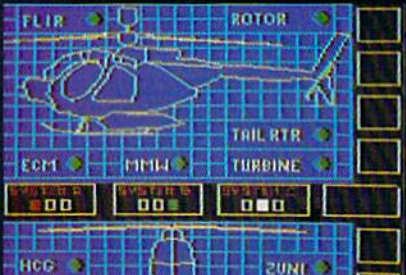

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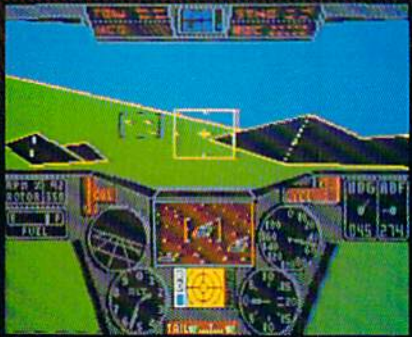

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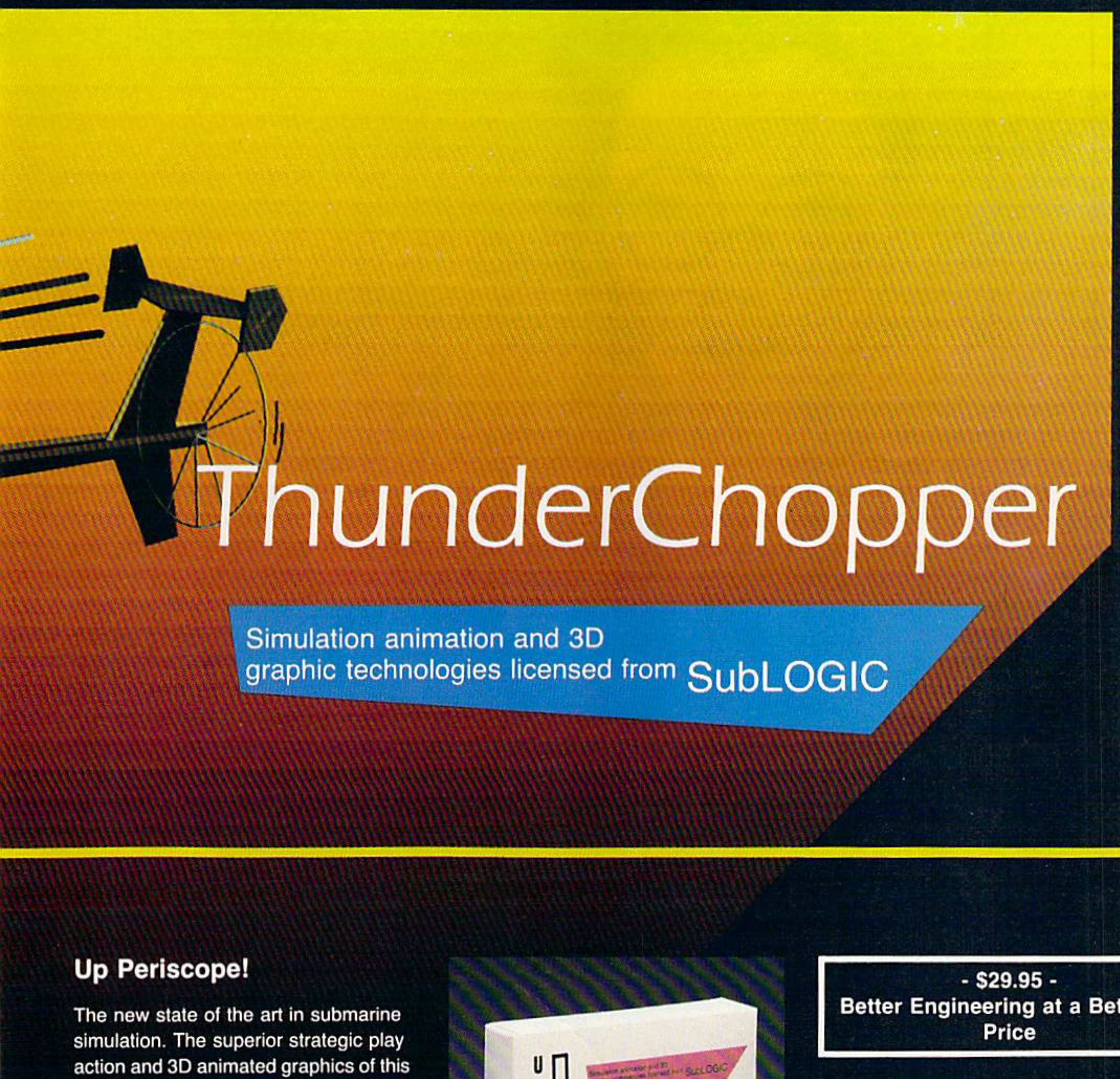

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DO'S AND DON'TS OF COMPUTER CARE

An ounce of prevention . . . can make the difference between frustration and satisfaction. Take these simple, sensible steps to avoid common problems.

By ANNETTE HINSHAW

Maybe your computer quits talking to you in the middle of a program. Or perhaps you turn on your system and the monitor doesn't light. What did you do wrong? Can it be fixed? Does it have to go to the shop? What do you do next?

Well, you'll be glad to know that you don't need special tools or knowledge to do many of the things experts do when their computers act up. The first steps to take are easy and safe for even the least experienced of us. They may cure your computer, or, if not, they should at least give you an idea where the problem is. Considering the hourly rate repair shops charge, every fix you can engineer yourself saves you money, as well as time and possible aggravation.

This article describes the easy first steps to take when your computer system malfunctions. A list of do's and don'ts accompanies it in Table 1.

Before you do anything, remember, *don't panic.* Most computer problems aren't serious; often they can be cured by just turning off the system and starting over. After all, operator error and software failure, in that order, are the most frequent causes of computer system malfunction. Hardware defects, usually the most difficult and costly to repair, are the least likely culprits.

Errors

The simplest problem you're likely to encounter is an error message on the screen or the flashing error light on the disk drive. While the flashing light on the drive is annoying, it doesn't hurt to leave it on. If you want to shut it off, execute an Initialize disk command with

```
OPEN 15,8,15:PRINT#15,"I":CLOSE 15
```

or else load a file.

An error message on the screen means you asked the computer to do something it can't handle. The user's guide that comes with your computer includes a list of error messages and what they mean. You'll also find descriptions of common ones and what to do about them in Table 2 of this article. If, after reading the table and your manual, you still don't understand some of them, ask a computing friend or someone at a user's group meeting.

Most of the standard error messages relate to program errors. Syntax error, for example, which is the computer's way of saying "Huh?", means you've misspelled or mispunctuated an instruction to the computer, or placed it in the wrong sequence. There are only a few messages that indicate a hardware problem. These include:

Device Not Present, which indicates that the computer can't find your disk drive or printer. If you get this error message, first make sure the drive or printer is turned on. If it is, turn it off and double-check the connections. When you power up again, make sure everything has lighted. If this procedure doesn't help, you may have a bad cable or a malfunction in the peripheral. I'll talk about

ILLUSTRATED BY STEVEN RYDBERG

how to isolate such difficulties in the Mix and Match section below.

The *File Not Found* error message means that either you have the wrong disk in the drive or you typed the filename incorrectly. Computers just do not understand "You know what I mean"; the filename must be *exactly* the same as the name in the disk directory, including spaces and punctuation. If necessary, load the directory to check the spelling.

A *File Open* or *File Not Open* error message occurs when you enter disk statements out of sequence. When you use an Open statement within a disk command, you must follow it with a Close statement before you execute an Open again for the same file number. On the other hand, if you're using a Print# statement within a disk command, you must first open the file. Study these commands in your user's manual if you have trouble with the File Open and File Not Open messages.

Any disk you do a lot of saving to and scratching from may get untidy.

Is the Power On?

A significant percentage of repair calls for any kind of appliance result from not plugging in the unit or failure to set a switch properly. Your computer system is complex, with many switches and cables that can come loose. The first thing to do when one component doesn't respond is turn off the power and systematically check all connections to make sure they're squarely and firmly seated.

Check the power cables for the computer and each peripheral at both ends. Trace the serial cables from the computer to the disk drive, and from the disk drive to the printer, testing each connection. Is the monitor cable hooked up right? Do you have it connected to the proper port for either TV or monitor?

Check your modem or anything else plugged into the user port or the expansion (cartridge) port. Make sure the plugs are squarely and completely inserted into the edgecard connectors. The metal tabs on the connectors can short and damage your computer if they're improperly grounded. Clean both the male and female connectors with a cotton swab and alcohol or contact cleaner if they look discolored or dirty. Make sure not to rub hard or leave cotton fibers behind and not to touch the metal strips with your hands. Oils from your body can create a poor connection or corrode the metal.

If you use a power strip, is it plugged in and turned on, and is the fuse still good? If there's no indicator light to show the power strip is on, check the fuse visually, and replace it if the thin metal strip that runs through the middle is broken.

Check the cassette plug if you have a non-Commodore printer with an interface that takes power from the cassette port. Is it squarely seated and all the way in? Do the metal tabs need cleaning?

Do you have power to the wall outlets you're using? Check them by plugging in a lamp and turning it on. If it lights, the outlet is fine. If the outlet is dead, check your circuit breaker or fuse box. Also check extension cords in your system, and replace any that are faulty.

Now turn your system on, one piece at a time: first the monitor, then the computer, then the disk drive and finally the printer. Check each unit to see that the power light is on, and double-check the switch and the power cords for any that don't light. If one of them still doesn't light, the indicator lamp could be burned out, but possibly the unit needs professional repair.

The question of whether everything is switched on can be subtle. I worry about my aging printer every time it doesn't respond as soon as I call for printing. The usual reason is that I left it off-line. I panicked once when the online switch didn't respond, but I had just left the reunion switch that trades the printer back and forth between two computers in the wrong position. Another problem that gives me gray hairs is my son's tendency to turn the TV brightness down so far that some screens don't show up. Think about the hidden switches in your system before you decide to take it to a repairman.

Disk Drives

Some of the peskiest problems computer users have are with disk drives. Many of these difficulties are intermittent and mysterious; that is, sometimes the drive works fine, and sometimes it doesn't.

The most common problem is trouble loading a program. There are several things to try if this happens.

First, check to see that the drive door is closed. On some of the older drives, if the disk is slightly crooked when you insert it, the door mechanism may pinch it and make the disk hard to read. Be sure the disk is squarely and firmly seated against the back of the drive, and never force a disk into the drive.

Try to load the same program again after you check the mechanics. Sometimes the drive will spin the disk for a few minutes as it attempts to read it.

If you still can't load the program, perhaps it's located on a damaged part of the disk. To test for this, try to load the directory off the disk. If that won't work, try the Initialize disk command, mentioned earlier, in Direct mode. Be sure to have a disk in the drive when you do this, to reset the physical position of the drive head. This procedure has cured my drive when powering down the system did not.

Another disk command that can cure mysterious problems is Validate:

```
OPEN 15,8,15:PRINT#15,"V":CLOSE 15
```

Any disk you do a lot of saving to and scratching from may get untidy; the Validate command will make sure all the storage links are where they should be. It also removes some kinds of unscratchable filenames from the directory.

When Validate doesn't help, try another disk. If you can load from it all right, then probably the first disk is damaged. Recovering from a damaged disk is beyond the scope of this article, but someone in a Commodore user's group may be able to help.

If the malfunctioning disk was written on someone else's drive, the problem could be that the alignment is off on either that one or yours, or even both. There's no cure for that situation except to rewrite the disk on a drive that's properly aligned and then make sure yours is, too.

You can suspect that your drive's alignment is drifting when you have trouble with several disks. The alignment on most drives goes out over time, especially if you use many programs that rattle the head as they load. As long as you can load commercial software, you can assume your alignment is all right. If you have increasingly frequent trouble loading programs, you should plan to take the drive to the shop fairly soon.

You can stretch the time before repair by cleaning the read/write head, because particles of dust or smoke that won't bother a drive in perfect alignment can create problems as the head drifts. Disk drive cleaning kits are available in office and computer supply stores for about $10. I clean my drives whenever they start acting flaky, and it usually solves the problem.

["Keep It Clean," in the July 1985 issue of *RUN*, gives more detailed information on cleaning a drive head. See page 6 in this magazine for instructions on ordering back issues. Eds.]

When a single program crashes while you're using it, the most likely cause is an operating mistake you made. Study the instructions for the program to make sure you're doing everything right. If so, the program may be defective.

Lockups, whether in the disk drive or the computer, are often due to overheating. If your drive works fine after you've turned off the system and let it cool, it's probably a heat problem. Check to see that none of the air vents are blocked. Set the drive up on wooden blocks so air can circulate under it. Place it in a well-ventilated spot or circulate air in your work area with a fan. You can also buy a cooling fan designed specifically for disk drives.

The chances are that someday you'll have a problem with your disk drive. The best precaution is to make frequent backups of your data and programs. Then, when a disk disaster hits, at least you won't lose the fruits of hours of work.

Printers

The printer is usually the hardest component of a computer system to deal with, because it's often the least standard component. Most non-Commodore printers have DIP switches that must be set when you connect the printer to the system. Some interfaces have DIP switches located inside the case, so you have to open it to get to them. You must make sure that the switches on both the printer and interface are set correctly. If you don't know what DIP switches are, read the manuals or ask an experienced user to help. Always change DIP switch settings with the power off.

When your printer is running well, but then stops unexpectedly, check the ribbon and paper. The paper may be jammed, or you may have run out of paper or ribbon (if it's a one-use carbon type).

Software incompatibility is the likely villain when your printer works with some programs but not with others. Many productivity programs, such as word processors and spreadsheets, come with configuration (setup) programs you have to run before the main program will work with your printer. Check the software instructions. Also, keep in mind that many programs that print out hi-res graphics won't work with printers like the Commodore 802 and 1526.

Other Peripherals

Monitors seldom have problems you can't fix by fiddling with the adjustment knobs. Read the manual that goes with your TV or monitor and follow the instructions for adjusting color, brightness, horizontal and vertical holds. Don't forget the volume knob if your shoot-'em-up game is suddenly silent.

Most modem problems are too complex to address here. However, you can check the originate/answer switch to make sure it's in the correct position, and you can make sure you have good connections to the telephone.

The most likely source of problems with joysticks, paddles and other small peripherals is loose or corroded connections. If you have experience with building electronic circuits or can get help, you'll probably find it easy to take these

Table 1. *Guidelines to careful computing.*

DO . . .

- Read instructions.
- Ask for help from user's groups and friends.
- Back up your disk data frequently.
- Keep disks in envelopes and store them in covered boxes.
- Protect your equipment with dust covers when not in use.
- Clean your disk drive occasionally (especially if you smoke).
- Surround your equipment with plenty of air flow.
- Ground yourself (touch something metallic) before you touch your equipment or disks, especially on low-humidity days.
- Treat your equipment gently.
- Plug your computer and all peripherals into a switched power strip. Unplug the power strip from the wall when it's not in use, especially on days when there might be an electrical storm.
- Use a voltage spike protector.
- Turn your system on, one piece at a time, in this order: monitor, computer, disk drive and printer. Turn it off in the reverse order.
- Turn off *all* equipment when connecting or disconnecting a peripheral; e.g., when moving the serial cable from one disk drive to another. This is especially important when plugging in or unplugging a joystick or mouse.

DON'T . . .

- Panic. Most problems aren't serious or permanent.
- Smoke or cook around your disk drive.
- Eat, drink or use chemicals around your system.
- Plug and unplug cables or cartridges when the power is on.
- Touch the exposed contacts on the joystick, cartridge, cassette and user ports with your fingers.
- Touch connectors with anything when the power is on.
- Block air vents on your equipment.
- Move your disk drive without inserting the cardboard head protector.
- Touch the shiny material on your disks.
- Write on disk covers with sharp points.
- Bend or put pressure on disks.
- Store disks near a television, electric motor or telephone bell.
- Set disks on top of your disk drive or monitor.
- Store disks near magnets or things made of iron that could generate a magnetic field.

units apart and repair them by cleaning connections or resoldering loose wires. Since they're relatively inexpensive, these peripherals are a good place to start learning to do some of your own repairs.

Table 2. *Non-program error messages.*

FILE OPEN. *Meaning:* You tried to execute an Open statement for a file that's already open. For example, you entered OPEN 15,8,15 when file 15 was already open. *Action:* Type CLOSE and the filenumber, such as CLOSE 15.

FILE NOT OPEN. *Meaning:* You tried to do a file operation without first opening the file. For example, you entered PRINT#15, V0 before you entered OPEN 15,8,15. *Action:* Insert an appropriate Open statement before the file operation.

FILE NOT FOUND. *Meaning:* The computer can't find the program or datafile you asked for. Either you have the wrong disk in the drive, or you didn't type the filename right. Every letter, space and special character in the filename must be exactly as in the directory. *Action:* Check the directory and copy down the exact filename, then type it in correctly. You may also be able to use a wild-card shortcut. (See Pattern Matching and Wild Cards on page 11 in the 1541 manual, or Pattern Matching on page 11 in the 1571 manual for more information on wild cards.) If you typed the filename right and have the right disk, try the Initialize disk command (page 17 in the 1541 manual; page 22 in the 1571 manual) to reset the drive head.

DEVICE NOT PRESENT. *Meaning:* The computer can't find the disk drive, cassette drive or printer. Either you typed the wrong device number, such as LOAD "*",9, when your disk drive is device 8; or you have a bad connection in the hookup between the computer and the peripheral; or the peripheral isn't turned on. *Action:* Type the statement correctly; turn off the system power and check the connections; or turn the peripheral on.

SYNTAX ERROR. *Meaning:* The computer didn't understand what you said. You have a typo in a command, or you used the wrong command format (syntax). For example, you typed LOOD 2*",8 instead of LOAD "*",8. *Action:* Type the command correctly. Check the format in your user's manual if necessary.

TYPE MISMATCH. *Meaning:* You got your signals crossed. You typed a number where you need a letter or vice versa. *Action:* Check the syntax. Did you substitute a letter O for a 0 or a letter l for a 1?

LOAD ERROR. *Meaning:* The computer isn't satisfied with the data it just tried to load. Internal error checking came up with the wrong answer. *Action:* In order of priority: 1) Try again. 2) Execute an Initialize command (page reference above). 3) Turn the disk drive off, wait a few seconds, and turn it on again. (Note: this procedure could hang up your computer.) 4) Clean the drive (especially if it's a tape drive). 5) Have the alignment checked.

An occasional Load error may be caused by overheating or a temporary power problem. Also, if only one disk or program produces Load errors, the software may be defective. Steps 4 and 5 above are appropriate only when the problem appears frequently and on more than one disk.

Miscellaneous

Problem: You can't read from the disk. *Action:* Check to see that there's a disk in the drive, the disk is right side up and the drive door is closed. Also, try removing the disk and reseating it in the drive.

Problem: You can't write to the disk. *Action:* Check to see if there's a write-protect tab on the disk, and remove it.

Problem: You load a program and type RUN, and all you get is a Ready prompt. *Action:* Check to see if this program should be loaded with a ,1 after the drive number. Machine language programs may require the form LOAD "filename",8,1 to locate properly in memory.

Mix and Match

If you've checked and double-checked to make sure you're doing everything right, and still there's something wrong, then what?

Try to find a "repair buddy"—someone who has a working computer system similar to yours, and who lives near enough that you don't mind hauling your system to his or her home. Now you can isolate any faulty equipment by substituting his components for yours, one piece at a time.

For example, to test a disk and your drive, try the disk in your buddy's system. If it loads and runs, the defect is in your drive. If it won't work, you may have a defective disk.

If your drive won't talk to you, hook another drive to your computer, or hook another computer to your drive. Either way, you'll soon know whether the problem is in the input/output circuit in the computer or in the disk drive itself.

Substituting parts shouldn't hurt your buddy's equipment, with one exception. If your computer turns off and on by itself, without your operating the power switch, the power supply is probably defective. Don't hook a suspected bad power supply to your friend's computer! Damage to the computer might result. However, you can safely try your friend's good power supply on your computer.

As you mix and match, don't forget to check cables, power cords, interfaces and expansion boards. You wouldn't want to pay a repair bill on your monitor if the problem were in the monitor cable, or replace a disk drive only to find the power cord had a broken wire.

Don't mix and match haphazardly. Think about how your system is behaving, and decide which unit is probably the culprit; then substitute a working unit. The greatest number of substitutions I ever had to make to isolate a defective component was three.

Even if you don't have a repair buddy, you can test components by giving some thought to how the system works. For example, suppose your monitor screen doesn't light up when you turn on the computer. You know the computer is on, because its power light is on, and you've tried turning the brightness knob on the video display. What should you do next?

First, put a disk in the drive and try to load the directory. If the busy light on the disk drive doesn't come on, one of the input/output chips in your computer may be bad. But if the busy light does come on, your problem could be the monitor cable.

When your computer malfunctions, as it probably will sooner or later, remember that most problems are minor and can easily be fixed. But if the procedures in this article don't help, ask for assistance at your user's group or take your system to a reliable repair facility, such as one authorized by Commodore.

Also keep in mind that your computer system is not exceptionally fragile, and nothing you do from the keyboard is likely to harm it. If you know how to proceed when a problem does crop up, then you can relax and enjoy.■

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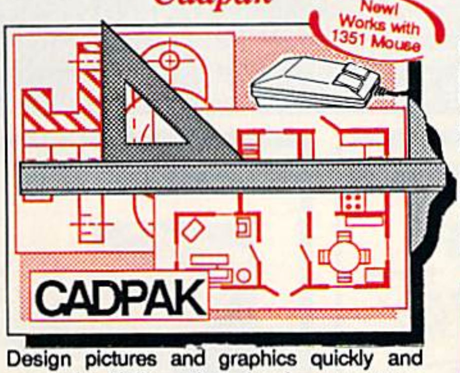
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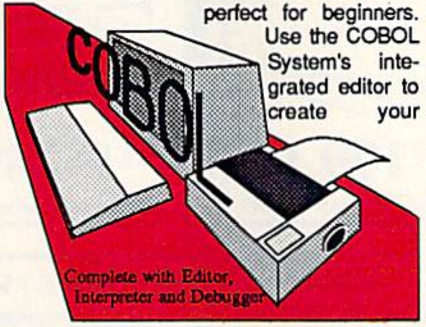
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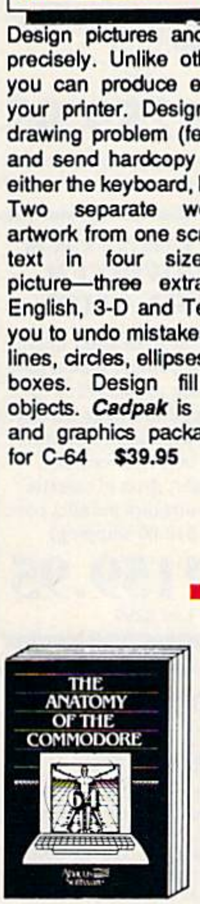
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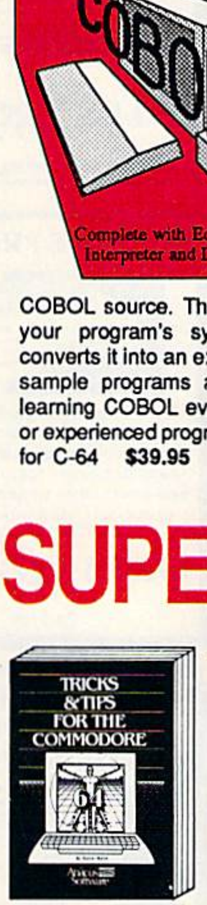
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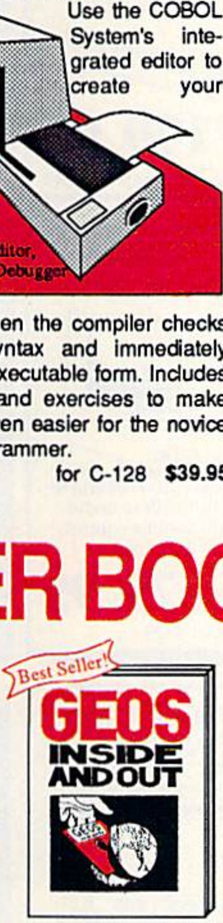
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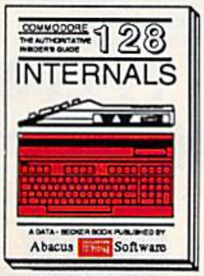
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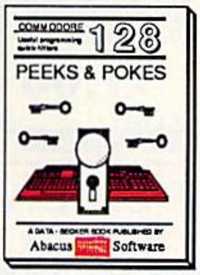
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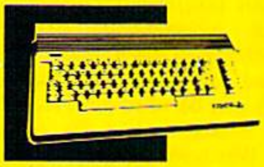

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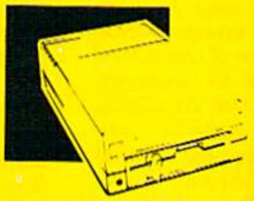

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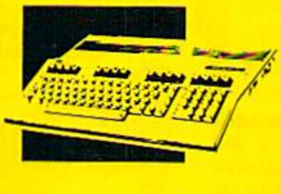

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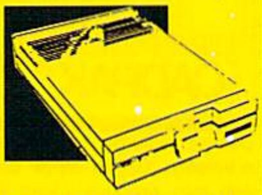

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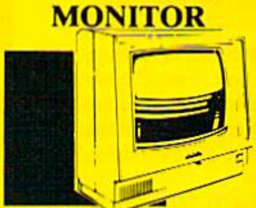

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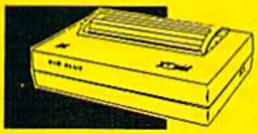

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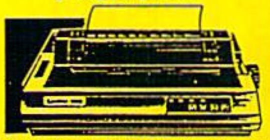

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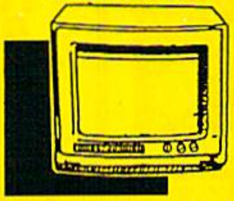

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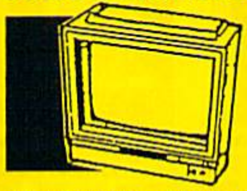

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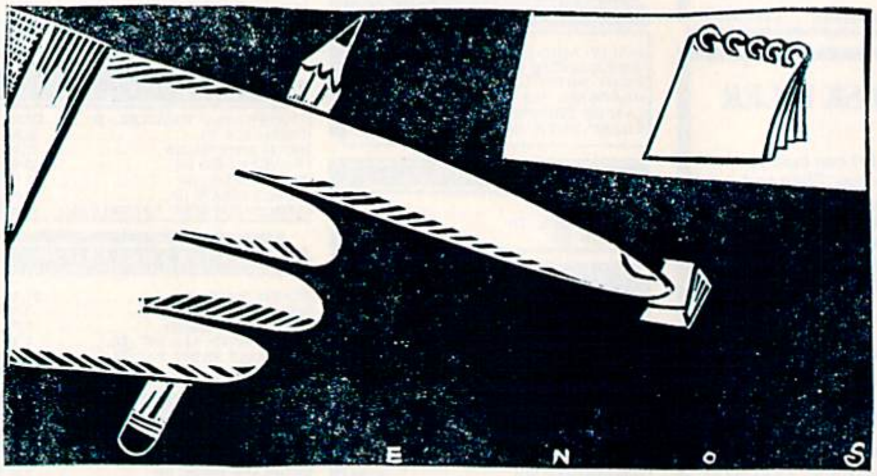
64 NOTEPAD COMMAND CENTER

Adding new, one-key disk commands makes this popular memo program easier and quicker to use.

By BOB KODADEK



In the January 1987 issue of *RUN*, I presented the first enhancement to my 64 Notepad program from the September 1986 issue. For those who may have missed it, 64 Notepad is a program that takes over control of the C-64 to provide an instant-access text window for jotting down and recalling programming notes—without affecting the original screen display. It is a machine language routine that's transparent to most other Basic programs, and so won't interfere with them.

The program in this article, a Basic loader called Notepad DOS (Listing 1), will add even more power to your 64 Notepad window. It provides a menu-driven DOS command center for viewing the disk directory, formatting or validating a disk, initializing the drive, or renaming, copying or scratching files, each operation accomplished by pressing only one key. I've also included a command that loads a binary file without altering the Basic memory pointers.

Because you don't need to enter command strings, Notepad DOS is faster, more convenient and easier to use than the DOS Wedge. Its functions will work while another program is executing, and you'll find them self-explanatory. The Simple Append program that was employed in January to create 64 Notepad II is also used here to create Notepad III, by adding Notepad DOS to Notepad II.

Since the Notepad DOS enhancement makes 64 Notepad rather large, it now takes a long while for the Data statement information to be poked into memory. For those who want to save time, I've included a small Basic program called Binary Save (Listing 2) that will make a fast-loading binary file out of Notepad III.

Typing in the New Routines

First, you must have a working copy of 64 Notepad II from January on disk. [If you don't already have the 64 Notepad, 64 Notepad II and Simple Append programs, see the note at the end of the article for instructions on obtaining them.] Then type in and save Listing 1 of this article, giving it the filename Notepad DOS. This is a temporary file that you'll append to the main Notepad routine in a while.

Before proceeding, load and run this temporary file to be sure you didn't make any errors in entering the Data statements. Don't expect the program to do anything at this point; this is just a test.

If no errors are reported, the next step is to add Notepad DOS to Notepad II with the Simple Append program. The proper syntax for an append is SYS (SA),"FILENAME", with the variable SA holding the starting address of the append routine. The SA value you should use is the default address 828 in the cassette buffer.

Load and run Simple Append, then load Notepad II. Next, place the disk containing Notepad DOS in the drive, and, in Direct mode, enter the following command:

```
SYS 828,"NOTEPAD DOS"
```

If no errors occur, the OK message will appear, indicating that you have a copy of Notepad III in memory. To save it, enter the following line:

```
SAVE"64 NOTEPAD III",8
```

Now, with the program safely on disk, you're ready to try it out.

Using the New Routines

You can access the DOS menu whenever the Notepad window is open by pressing control/D. The one-key commands that will appear are listed in Table 1. To select the function you want, just press the appropriate key. If the routine

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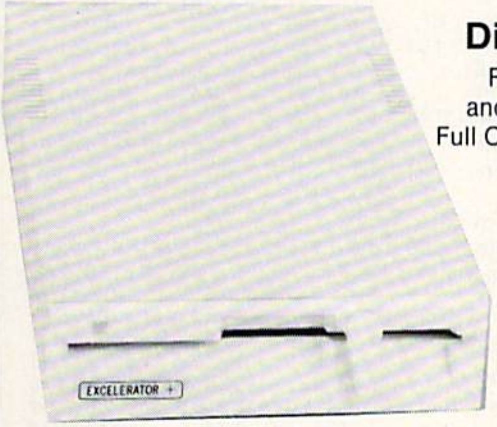

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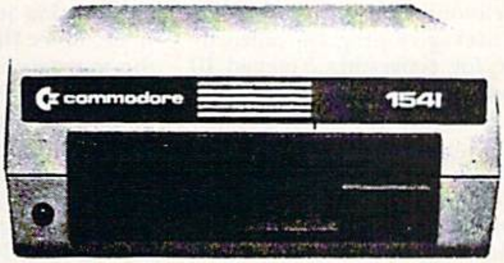

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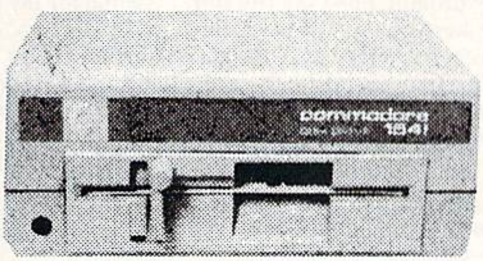

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needs any information from you, it will issue a prompt at the appropriate time.

You can abort any operation on the menu by pressing the stop key, and the current status of the error channel always appears at the bottom of the menu screen. To return to viewing your notes, select the Exit option, or to return to Basic, press control/C to close the window.

Converting Basic to Binary

As I mentioned, I've included in the Notepad package a program called Binary Save for converting Notepad III into a fast-loading binary file. If you want this feature at your disposal, type in and save Listing 2.

It would be a good idea to store the binary file that Binary Save will create on a newly formatted disk, so prepare one and have it handy. Then turn your computer off and on to clear out any resident programs.

Next, load and run Notepad III, and, at the ready prompt, press the run-stop and restore keys simultaneously to disable the Notepad interrupt. Now, load and run Binary Save, and when it asks for the filename and locations of the machine language program, respond as follows:

FILENAME? 64 NOTEPAD V3.0
START ADDRESS? 50448
END ADDRESS? 52801

When you insert the formatted disk and press return, Notepad will be stored as a binary file.

To execute this file, you need the Notepad Boot program in Listing 3. Type it in and save it on the same disk as the binary file. Now, whenever you want to use 64 Notepad, just load and run Notepad Boot. The binary file will boot in only eight seconds, a considerable saving in time.

You can use Binary Save to make a binary file out of any data area in memory, whether it be a machine language program, a hi-res screen, a sprite or something else. All you need are the starting and ending addresses of the section of memory you want to be saved. These binary files can be loaded with the ,8,1 syntax or the Notepad DOS BLoad command.

Program Won't Run?

Unfortunately, it's not easy to type in a program from a magazine listing and get it all right, especially a listing like Notepad DOS that has a lot of Data statements. If you type in Notepad DOS and it won't work, first bear in mind that all *RUN* programs are tested thoroughly by both the author and the magazine staff prior to publication, so the mistake is probably in your listing.

Also, while checksum numbers are helpful, they aren't foolproof. A checksum you get that agrees with the one in the magazine, especially in Data statements, doesn't necessarily mean you typed everything right, because the checksum is only a total of all the data numbers. Those numbers can be in the wrong order, and the checksum will still be correct.

The best way I've found to locate typing errors is to make a printout of the faulty listing and carefully compare the values in the Data statements to those in the magazine listing. They must all match *perfectly*. Even one misplaced comma or a period substituted for a comma can result in an Out of Data or other type of error.

After you've found the problem, make the necessary corrections to your listing and resave it. If you still can't find your error, I'll find it for you if you send me a printout of your program and include a self-addressed, stamped business envelope for my reply.

I'd like to express appreciation to those readers who've written in with kind words and suggestions for 64 Notepad. Thanks everyone, and enjoy!

Bob Kodadek is a professional automotive technician, programmer and freelance writer. You can write to him at 3164 Surrey Lane, Aston, PA 19014.

Table 1. *Notepad DOS commands.*

D	Directory
N	Format
R	Rename
I	Initialize
B	Bload
V	Validate
C	Copy
S	Scratch
Q	Quit

To obtain the 64 Notepad, 64 Notepad II and Simple Append programs, you have a choice:

—Write for the September 1986 and January 1987 issues of RUN. *Address your order to* RUN, *Back Issues, 80 Elm St., Peterborough, NH 03458. Send along $3.50, plus $1 shipping and handling, for each copy.*

—Order the September-October 1986 and January-February 1987 ReRUN disks. You'll find an order form in this magazine on the page listed for ReRUN Back Issues in the List of Advertisers on the back page.

Listing 1. *Notepad DOS program.*

```
142 REM 64 NOTEPAD DOS :REM*154
143 REM BY BOB KODADEK :REM*119
144 REM 3164 SURREY LANE:REM*70
145 REM ASTON, PA{2 SPACEs}1901
    4                   :REM*241
146 REM                 :REM*208
147 MEM=51856:A=50496:CS=0:FORI
    =0TO944:READ BY      :REM*57
148 IF BY >255 THEN PRINT"ERROR
     IN LINE:"PEEK(63)+PEEK(64)
    *256:END            :REM*142
149 POKE MEM+I,BY:CS=CS+BY:NEXT
                        :REM*239
150 IF CS <> 113486 THEN PRINT"
    CHECKSUM BAD, CHECK ALL DAT
    A.":END               :REM*0
151 POKE A,144:POKE A+1,202
                         :REM*69
152 DATA 173,141,2,201,4,240,3,
    76,71,200,165,197,201,18,20
    8,247,32,59,201      :REM*86
153 DATA 32,117,201,32,16,201,1
    62,50,160,205,32,37,206,32,
    21,204,32,204        :REM*59
154 DATA 197,32,228,255,240,248
    ,141,141,202,201,68,208,3,7
    6,87,203,201,73     :REM*134
155 DATA 208,3,76,235,204,201,8
    6,240,249,201,81,208,9,32,1
    6,201,32,141,201    :REM*129
156 DATA 76,49,200,201,83,208,1
    6,32,28,205,162,7,160,206,3
    2,251,203,32,68      :REM*88
157 DATA 204,76,232,204,201,82,
    208,13,32,28,205,162,16,160
    ,206,32,251,203      :REM*29
158 DATA 76,223,204,201,67,208,
    13,32,28,205,162,24,160,206
    ,32,251,203,76      :REM*190
159 DATA 223,204,201,66,208,51,
    32,28,205,162,30,160,206,32
    ,251,203,169,0      :REM*163
160 DATA 32,144,255,32,68,204,3
    2,114,204,162,8,134,186,169
    ,1,133,185,173      :REM*126
161 DATA 140,202,162,96,160,202
    ,32,189,255,166,43,164,44,1
    69,0,32,213,255     :REM*179
162 DATA 76,166,202,201,78,208,
    6,32,59,204,76,232,204,76,1
    79,202,32,16,201    :REM*104
163 DATA 162,9,134,253,32,12,20
    4,169,55,133,1,169,1,162,49
    ,160,205,32,189     :REM*163
164 DATA 255,169,96,133,185,32,
    213,243,165,186,32,180,255,
    165,185,32,150      :REM*252
165 DATA 255,169,0,133,144,160,
    3,132,183,32,165,255,133,19
    5,32,165,255,133      :REM*11
166 DATA 196,164,144,208,60,164
    ,183,136,208,235,166,195,16
    5,196,32,205,189      :REM*32
167 DATA 32,165,255,166,144,208
    ,41,201,0,240,6,32,210,255,
    76,161,203,169        :REM*67
168 DATA 13,32,210,255,230,253,
    165,253,201,22,208,10,32,21
    5,203,32,16,201     :REM*178
169 DATA 162,9,134,253,32,12,20
    4,160,2,76,133,203,32,215,2
    03,76,222,203,32    :REM*189
170 DATA 225,255,208,11,104,104
    ,32,66,246,32,171,255,76,16
    6,202,162,23,32       :REM*12
171 DATA 14,204,162,57,160,199,
    32,251,203,32,228,255,201,1
    3,208,221,96,134      :REM*97
172 DATA 251,132,252,160,0,177,
    251,240,6,32,210,255,200,20
    8,246,96,166,253      :REM*22
173 DATA 160,6,24,32,240,255,96
    ,162,21,160,10,32,16,204,16
    9,8,133,186,32        :REM*51
174 DATA 180,255,169,111,133,18
    5,32,150,255,32,165,255,201
    ,13,240,6,32,210      :REM*72
```

```
175 DATA 255,76,42,204,32,171,2
    55,96,32,28,205,162,213,160
    ,205,208,10,162     :REM*185
176 DATA 184,160,205,208,4,162,
    179,160,205,32,251,203,169,
    96,133,253,169       :REM*56
177 DATA 202,133,254,160,0,140,
    140,202,96,160,205,162,196,
    32,251,203,169      :REM*163
178 DATA 61,160,0,140,140,202,1
    45,253,230,253,96,164,204,2
    40,8,164,211,177    :REM*152
179 DATA 209,9,128,145,209,32,2
    25,255,208,5,104,104,76,166
    ,202,32,228,255      :REM*69
180 DATA 240,229,201,13,240,41,
    201,20,240,51,174,140,202,2
    24,19,240,214       :REM*200
181 DATA 201,127,176,210,201,32
    ,144,206,201,34,240,202,160
    ,0,145,253,230      :REM*111
182 DATA 253,238,140,202,32,210
    ,255,32,59,201,76,114,204,3
    2,59,201,169,13     :REM*172
183 DATA 32,249,198,160,0,152,1
    45,253,96,174,140,202,240,1
    65,206,140,202       :REM*95
184 DATA 198,253,32,59,201,162,
    105,160,199,32,251,203,76,1
    14,204,32,74,204     :REM*84
185 DATA 32,114,204,32,95,204,3
    2,114,204,169,8,133,186,32,
    177,255,169,111     :REM*183
186 DATA 133,185,32,147,255,173
    ,141,202,32,168,255,169,48,
    32,168,255,169       :REM*60
187 DATA 58,32,168,255,160,0,18
    5,96,202,240,6,32,168,255,2
    00,208,245,32       :REM*181
188 DATA 174,255,76,166,202,32,
    16,201,162,22,32,14,204,162
    ,238,160,205,32      :REM*90
189 DATA 251,203,162,10,32,14,2
    04,96,36,68,79,83,32,77,69,
    78,85,13,13,29      :REM*221
190 DATA 68,58,68,73,82,69,67,8
    4,79,82,89,13,29,78,58,70,7
    9,82,77,65,84,13     :REM*40
191 DATA 29,82,58,82,69,78,65,7
    7,69,13,29,73,58,73,78,73,8
    4,73,65,76,73,90    :REM*155
192 DATA 69,13,29,66,58,66,76,7
    9,65,68,13,29,86,58,86,65,7
    6,73,68,65,84,69    :REM*116
193 DATA 13,29,67,58,67,79,80,8
    9,13,29,83,58,83,67,82,65,8
    4,67,72,13,29,81    :REM*187
194 DATA 58,69,88,73,84,13,13,1
    8,18,32,83,84,65,84,85,83,5
    8,146,32,87,79      :REM*244
195 DATA 82,75,73,78,71,46,46,4
    6,0,13,29,78,69,87,13,29,70
    ,73,76,69,78,65     :REM*209
196 DATA 77,69,58,0,13,29,79,76
    ,68,13,29,70,73,76,69,78,65
    ,77,69,58,0,13      :REM*112
197 DATA 29,70,79,82,77,65,84,3
    2,68,73,83,75,13,13,29,78,6
    5,77,69,44,73,68    :REM*197
198 DATA 58,0,32,32,32,80,82,69
    ,83,83,32,60,83,84,79,80,62
    ,32,84,79,32,65     :REM*116
199 DATA 66,79,82,84,0,83,67,82
    ,65,84,67,72,13,0,82,69,78,
    65,77,69,13,0,67     :REM*25
200 DATA 79,80,89,13,0,66,76,79
    ,65,68,13,0,134,251,132,252
    ,162,9,160,0,177     :REM*40
201 DATA 251,240,15,230,251,32,
    210,255,201,13,208,241,232,
    32,52,201,144       :REM*133
202 DATA 235,96              :REM*34
```

Listing 2. *Binary Save program.*

```
10 REM SIMPLE BINARY SAVE
                        :REM*30
20 REM BY BOB KODADEK  :REM*252
30 REM 3164 SURREY LANE:REM*212
40 REM ASTON, PA 19014 :REM*136
50 REM                 :REM*112
60 CLOSE 1:OPEN 1,8,15:A=780:X=
   781:Y=782           :REM*136
70 INPUT"{6 SPACEs}FILENAME";F$
   :IF F$=""THEN 200   :REM*186
80 INPUT"START ADDRESS:";SA
                       :REM*128
90 INPUT"{2 SPACEs}END ADDRESS:
   ";EA:PRINT           :REM*56
100 PRINT"INSERT FORMATTED DISK
     INTO DRIVE A."    :REM*246
110 PRINT"{CRSR DN}WHEN READY,
    PRESS RETURN.";:SYS 65487:P
    RINT                :REM*24
120 FORI=1TOLEN(F$):POKE827+I,A
    SC(MID$(F$,I,1)):NEXT
                        :REM*78
130 POKE A,0:POKE X,8:POKE Y,0:
    SYS 65466          :REM*202
140 POKE A,LEN(F$):POKE X,60:PO
    KE Y,3:SYS 65469   :REM*218
150 B=SA:GOSUB210:POKE 251,L:PO
    KE252,H            :REM*208
160 B=EA:GOSUB210:POKE X,L:POKE
     Y,H               :REM*164
170 POKE A,251:SYS 65496:REM SA
    VE                  :REM*84
180 INPUT#1,E$,F$,G$,H$:CLOSE 1
    :C$=","             :REM*54
190 PRINT"DRIVE STATUS: "E$+C$+
    F$+C$+G$+C$+H$     :REM*134
200 END                :REM*202
210 H=INT(B/256):L=B-256*H:RETU
    RN                  :REM*76
```

Listing 3. *Notepad Boot program.*

```
10 REM{2 SPACEs}64 NOTEPAD V3.0
    BINARY LOADER       :REM*28
20 F$="64 NOTEPAD V3.0" :REM*38
30 IF A=0 THEN A=1:PRINT"LOADIN
   G "F$:LOAD F$,8,1    :REM*58
40 PRINT:PRINT"OK, SET THE TIME
   ."                   :REM*92
50 INPUT"{CRSR DN}{2 SPACEs}HOU
   RS";T(1):IFT(1)>12THEN50
                       :REM*150
60 INPUT"MINUTES";T(2):IFT(2)>5
   9THEN60             :REM*148
70 FORI=1TO3:H=INT(T(I)/10):L=T
   (I)-10*H:T(I)=16*H+L:NEXT
                        :REM*20
80 C=56587:POKEC+4,PEEK(C+4)AND
   127                  :REM*90
90 FORI=0TO3:POKEC-I,T(I+1):NEX
   T                    :REM*92
100 PRINTCHR$(147)SPC(252)F$
                        :REM*50
110 PRINTSPC(83)"1.PRESS CTRL-O
     TO OPEN WINDOW."   :REM*50
120 PRINTSPC(83)"2.PRESS CTRL-C
     TO CLOSE WINDOW." :REM*228
130 PRINTSPC(83)"3.PRESS RUN/ST
    OP-RESTORE TO DISABLE."
                        :REM*44
140 PRINTSPC(83)"4.TO RE-ENABLE
    , ENTER SYS 51072.":SYS 510
    72                 :REM*196
150 NEW                 :REM*32
```

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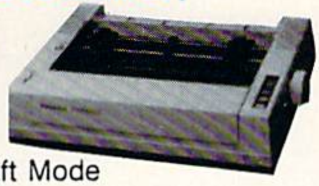

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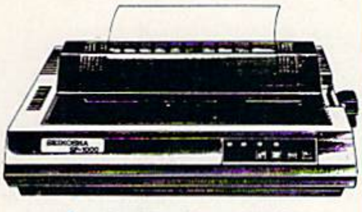

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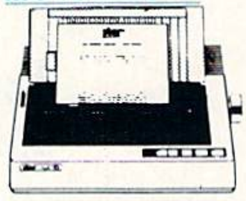

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THE EXPANDING WORLD OF GEOS

GEOS lets you explore new horizons with desktop publishing and an address book that dials phone numbers. Other features soon to be released are geoFile, geoCalc and a C-128 version.

By MATTHEW STERN

Berkeley Softworks introduced GEOS at the 1986 Winter Consumer Electronics Show (CES) in Las Vegas with a handful of employees running a small booth toward the back of the West Hall. At this year's CES, Berkeley's booth was an impressive, two-story complex manned by a contingent of a dozen employees. Indeed, Berkeley has grown over the past year and a half.

So has Berkeley's GEOS product line. The newest features in the GEOS landscape include desktop publishing with a laser printer, a handy accessory that stores and dials phone numbers, and a few more surprises.

Writer's Workshop

The new Writer's Workshop is a collection of word processing programs that enable you to do desktop publishing. It features an enhanced version of the geoWrite word processor, version 2.0; geoLaser, which prints geoWrite documents on the Apple LaserWriter; Text Grabber, which reads files from other word processors; and geoMerge, which merges data with documents.

Writer's Workshop also contains five new fonts. Four of them are designed to work with the LaserWriter, although they're also attractive on a dot matrix printer. These four fonts include special characters, such as braces ({ }) and the backslash (\), that aren't normally available on the Commodore. The fifth font, called Commodore, provides a standard 10-point character set for near-letter-quality (NLQ) printing.

geoWrite 2.0

GeoWrite 2.0 is a tremendous improvement over geoWrite 1.0; it's now a true, full-featured word processor. For instance, with the enhanced formatting options, you can center text, align it to the left or the right, or justify it to be flush against both margins. Single, one-and-a-half and double line spacing are available. A paragraph marker automatically indents the first line of each paragraph.

For tables, geoWrite will let you set regular tabs to align text to the left, or decimal tabs to align numbers by the decimal point. You can mix formats within a document by making changes on the ruler. For example, you can double space one paragraph and indent and single space another. With GEOS, of course, what you see on the screen is exactly what you get on paper.

GeoWrite 2.0 lets you create multiple-line headers and footers in a special window. These headers and footers can include the date, time and page number; and the starting page number can be changed, which is useful when breaking a large file into smaller ones.

The search-and-replace feature is easy to use, yet effective. It will look for a whole or partial word, and it will search just the current page or the entire document.

You operate geoWrite with easy-to-use, mouse-controlled menus and icons. However, if you want to keep your hands on the keyboard, it offers keyboard equivalents for the most frequently used commands. For example, pressing Commodore/X cuts the highlighted text, and the cursor keys let you move around the document.

The program provides a number of printing options. High Quality mode prints out the entire document, including text and graphics. Draft mode prints just the text in the printer's High Speed mode, which is useful for making a quick copy. If you have a daisy wheel or near-letter-quality printer, NLQ mode prints

ILLUSTRATED BY BOB SCOTT

just text in the highest quality font. GeoWrite 2.0 prints on both cut-sheet or continuous-feed paper.

geoLaser

Writer's Workshop includes one other printing option: near-typeset-quality printing on an Apple LaserWriter printer. This is accomplished through the geoLaser utility.

GeoLaser prints out both text and geoPaint graphics on the LaserWriter. It produces its attractive near-typeset-quality fonts by substituting the LaserWriter's resident fonts for those in your document. For this reason, when you intend to use geoLaser, you should use Writer's Workshop's LaserWriter-compatible fonts in creating your document. The LaserWriter can print other GEOS fonts, but not in near-typeset quality.

GeoLaser's overlay feature is an important one for desktop publishing. It lets you print one page over another, so you can have multiple columns, overlay text onto graphics or place paragraphs in a border.

For those of us who can't afford an Apple LaserWriter, Berkeley offers a laser printing service on QuantumLink. Send your files over your modem, and Berkeley will print them out and return them by first class mail. At this writing, the rates are $3 for the first page, $1 for each additional page and 50 cents per copy, with no additional charge for overlays.

If you do have a LaserWriter, you'll need an RS-232C interface. Berkeley recommends the Jameco JE-232CM for this purpose. GeoLaser will transmit data to the LaserWriter at 9600 or 1200 baud, depending on the type of interface.

Text Grabber

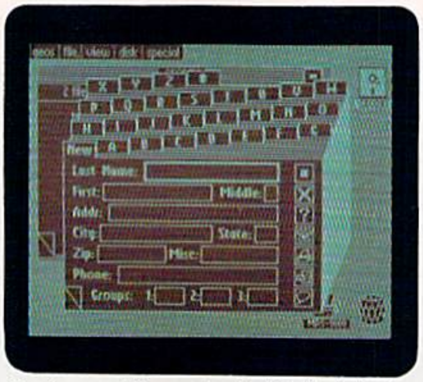
With GEOS's new desktop publishing capabilities, you may want to convert your old word processing documents to geoWrite format. This is possible with the Writer's Workshop Text Grabber utility.

Text Grabber reads in and converts files from any other word processor. If the file to be converted was created on Batteries Included's PaperClip, Timeworks' WordWriter, Commodore's Easy Script or SpeedScript, Text Grabber will format it according to the file's original formatting commands. If your file is from a word processor other than these, Text Grabber will convert it without formatting.

geoMerge

GeoMerge is a powerful utility that is included with both Writer's Workshop and geoDex (see below). Its conditional fields enable it to create sophisticated form letters.

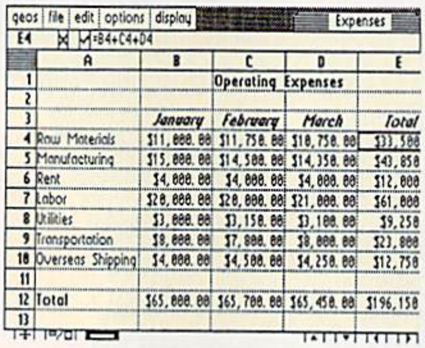
First you compose your form letter with geoWrite, indicating where information is to be inserted by entering the field names in a <<Firstname>> format. Then you extract data for the merge in one of three ways: from a geoDex file, by typing data into a geoWrite file or by entering it manually as you go along. As with geoWrite 2.0, you can print on single sheets or continuous paper in High Quality, Draft or NLQ mode.



Keep yourself organized with Berkeley's electronic directory, geoDex.

GeoMerge's real flexibility comes from adding conditions to fields in your file. This capability lets you create more personalized form letters. For instance, let's say you want to thank those clients who've paid their bills and give a friendly reminder to those who haven't. You might include the following in your document:

<<IF overdue = "yes">> We hope you will take care of the overdue amount as soon as possible. <<ELSE>> Thank you for your continued patronage. <<ENDIF>>



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9	Transportation	$8,000.00	$7,000.00	$8,000.00	$23,000
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11					
12	Total	$65,000.00	$65,700.00	$65,450.00	$196,150
13					

Budget, estimate, calculate, analyze and plan with geoCalc.

If "yes" was in the overdue field, the first sentence is printed. Otherwise, the sentence after <<ELSE>> is printed. The document resumes printing after <<ENDIF>>.

geoDex

The geoDex utility files names and addresses, prints labels and reports, and dials phone numbers. Since it's a desktop accessory, you can use it while working with other programs.

When you select geoDex from the GEOS menu, a familiar-looking stack of index cards appears on the screen. Each card contains a record of a person in your address book. Each record contains twelve predefined fields, into which you enter the person's name, address and telephone number, as well as any comments you may have. You can assign up to three three-letter category names to each record, so you can extract the names of people who have certain characteristics in common. For example, you could enter 10S for your friends who play tennis or PTA for fellow PTA members. Clicking the Group icon displays the people who belong in that category.

GeoDex will search for records by any field, and wild-card characters provide added flexibility. For example, if you enter Ma*, the program will list everyone whose name starts with Ma. The question mark serves as a place holder. Enter M??t, and geoDex will find Matt, Mort and Milt.

GeoDex offers a number of printing options. You can produce a phone list that includes just names and numbers, a complete printout of all the fields in a record or mailing labels on 1- or 1½-inch forms. If you've extracted records with a search, only those records will be printed.

To use the autodialing feature of geoDex, select the record with the phone number you want to dial and click the Dialing icon (or press Commodore/D). Autodialing requires a Commodore 1670 or compatible modem. If you use a long-distance service like MCI or Sprint, you'll have to include your access code with the person's phone number, or dial it manually.

geoFile and geoCalc

Two other Berkeley products, which should be available in the spring of this year, will enhance GEOS's ability to manage information. GeoFile and geoCalc combine a surprising number of special features with GEOS's easy point-and-click controls.

GeoFile is unique in being able to combine data and pictures. You design full-page forms for entering data, which can include geoPaint graphics (such as an identifying symbol or company logo) and a variety of typestyles. To arrange fields on the form, you just move them into place. You can resize fields easily to accommodate any number of lines of text.

Because GEOS uses virtual memory, your files are limited only by disk space. GeoFile offers an unlimited number of fields per record, and up to 1200 records per file.

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Circle 98 on Reader Service card.

Powerful searching and sorting features of the program let you look for specific information and perform keyword searches on any number of characters. With that information, you can print out labels or full-page reports, or use geoMerge to merge data with geoWrite documents.

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One of GEOS's most useful features is its provision for integrating its various applications. For instance, you can paste a geoCalc spreadsheet into a geoWrite document, manipulate geoFile data with geoCalc and insert geoFile data into a geoWrite document with geoMerge.

Table 1. *Product information.*

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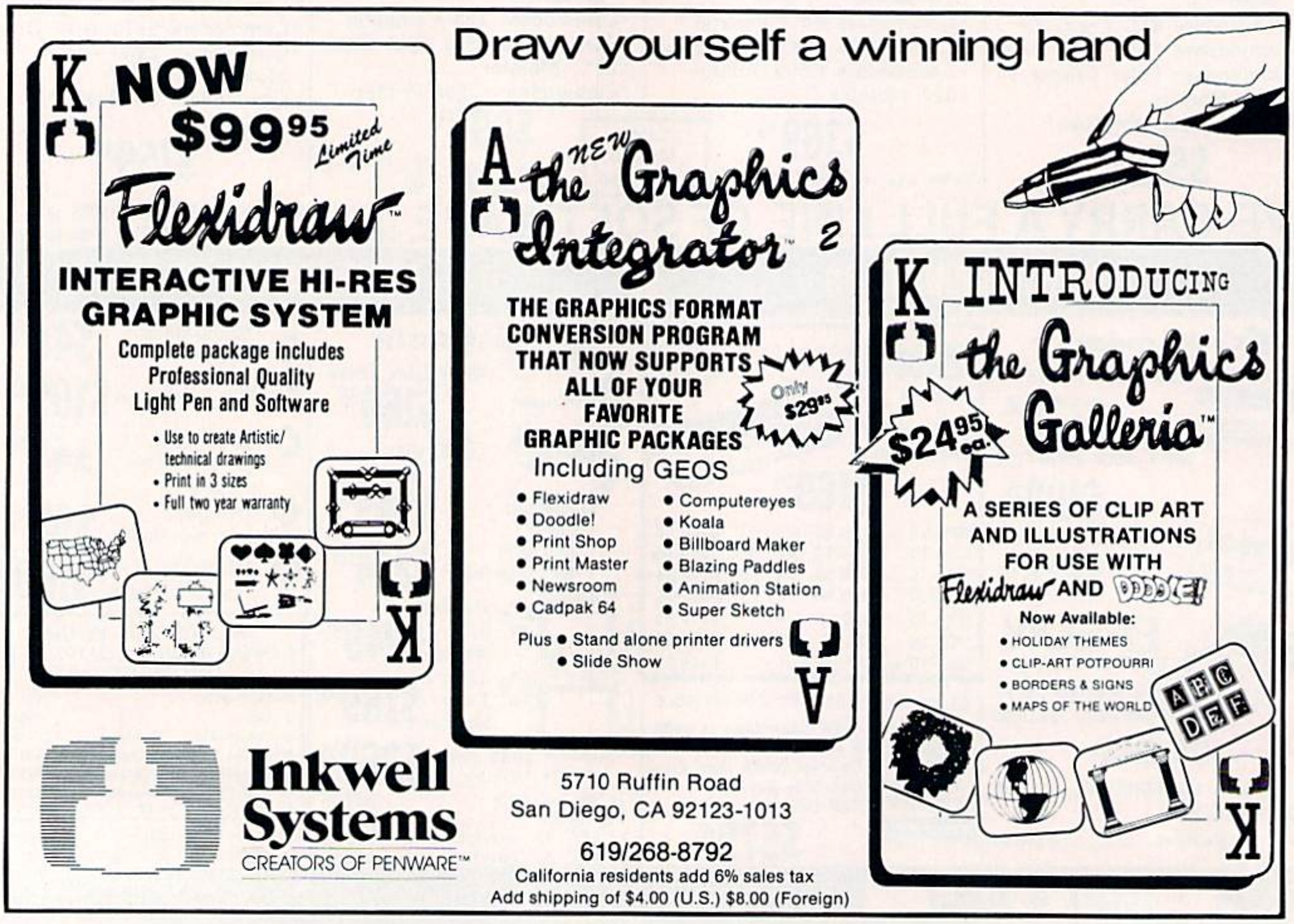
According to Berkeley, most C-64 GEOS files will be compatible with GEOS 128, and the company plans to release C-128 versions of all current GEOS programs to complement it. Registered owners of the program will be eligible to receive low-cost upgrades. ■

Matthew Stern is a freelance writer on Commodore and other personal computers. You can write to him at PO Box 17825, Irvine, CA 92713.



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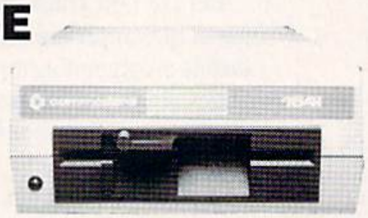

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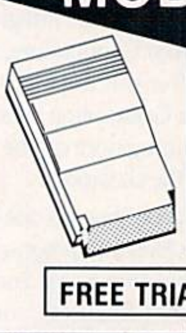

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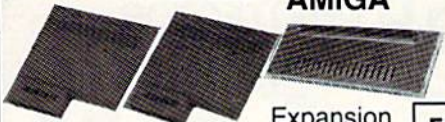

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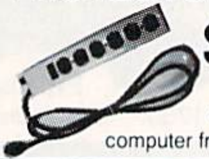

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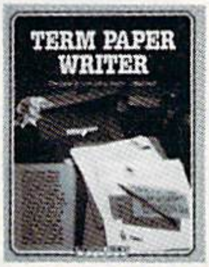

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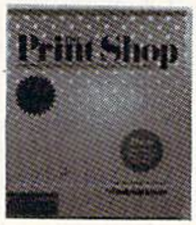

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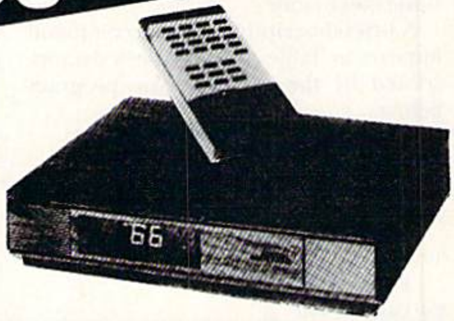

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BASIC BUG TRAP

Anyone, whether programmer or not, can benefit from this debugging utility.

By MICHAEL BROUSSARD

If you're cursing the elusiveness of the bugs plaguing your programs, Debugger 64 can come to the rescue! This utility eliminates the need for adding and deleting Stop and Print statements to find a Basic program bug. Instead, it adds to Basic several new commands that let you set dynamic breakpoints, step through your program one statement at a time, examine your program's history of Gosub invocations and view the line number of each statement as it's executed.

Type in Debugger 64 (Listing 1), using *RUN*'s 64 Perfect Typist program (see How To Type *RUN* Listings in this magazine). Be sure to save the debugger to disk before you run it, because the SYS 49152:NEW statement in line 95 resets pointers and erases the program from memory during execution.

When you're ready to use Debugger 64, load it into memory and run it to activate the debugging commands. Then load the program you want to debug, or type one in from scratch.

Debugger 64's commands are meant to be used in Direct mode, but most will also work from within another program. The commands begin with the @ character, to distinguish them from regular Basic commands.

A brief description of each command appears in Table 1. Their use is demonstrated by the sample Basic program below.

Debugger 64 in Action

Load and run Debugger 64, then type in and save the following code:

```
10 PRINT "SAMPLE DEBUGGER
   PROGRAM"
20 GOSUB 100
30 PRINT "END OF PROGRAM"
40 END
100 PRINT"THIS IS LINE 100.":
    PRINT"TIME TO GOSUB!"
110 GOSUB 200
120 RETURN
200 PRINT"THIS IS LINE 200."
210 GOSUB 300
220 RETURN
300 PRINT "THIS IS LINE 300."
310 X = 10
320 X = X*2 + 5 : RETURN
```

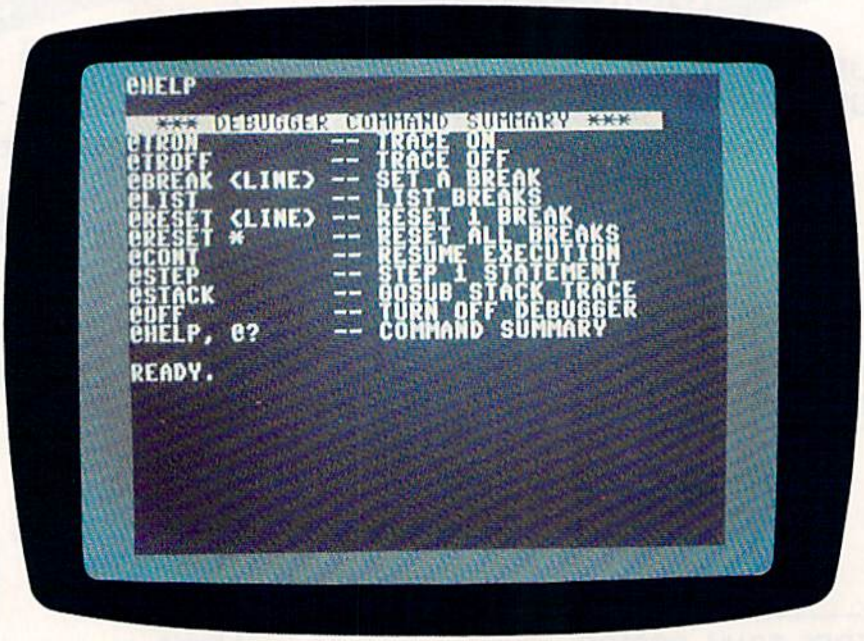
When you're done, run the sample program once to see how it works. Then enter @HELP or @? to view a summary of the Debugger 64 commands.

Now enter @TRON and run the sample program again. Note how Debugger 64 prints a line number message in reverse video before each line of the sample is executed.

Next turn @TRON mode off by entering @TROFF, set a breakpoint by entering @BREAK 200 and run the sample program a third time. Execution pauses just before line 200, and a Break In 200 message appears.

To examine the history of Gosub invocations, enter @STACK. The resulting display looks like:

```
*** STACK TRACE ***
GOSUB 100 FROM LINE 20
GOSUB 200 FROM LINE 110
```



```
@HELP

 *** DEBUGGER COMMAND SUMMARY ***
@TRON          -- TRACE ON
@TROFF         -- TRACE OFF
@BREAK <LINE> -- SET A BREAK
@LIST          -- LIST BREAKS
@RESET <LINE> -- RESET 1 BREAK
@RESET *       -- RESET ALL BREAKS
@CONT          -- RESUME EXECUTION
@STEP          -- STEP 1 STATEMENT
@STACK         -- GOSUB STACK TRACE
@OFF           -- TURN OFF DEBUGGER
@HELP, @?      -- COMMAND SUMMARY

READY.
```

Screen display from the Debugger program.

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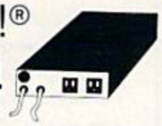

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Circle 155 on Reader Service card.

Enter @BREAK 300 and press the return key, followed by @BREAK 310 and another return. Then, to check the breakpoints you've set, enter @LIST. Three breakpoint numbers—200, 300 and 310—should appear.

Now resume execution of your program by entering @CONT. The Print statement in line 200 will be executed, but the next breakpoint will make the program halt at line 300. Enter @CONT once more to continue execution until the last breakpoint produces the message, Break In 310.

Then, when you reinspect the Gosub history with @STACK, the following display appears:

```
*** STACK TRACE ***
GOSUB 100 FROM LINE 20
GOSUB 200 FROM LINE 110
GOSUB 300 FROM LINE 210
```

Examine line 310 by entering LIST 310, and check the value of X by entering PRINT X. Since line 310 hasn't been executed, the value should be 0. Once you've verified this, enter @STEP. Debugger 64 then executes line 310 and prints a Stepping: Break In 320 message to the screen.

Next enter PRINT X again and notice that the value of X has changed to 10. Enter @STEP and inspect the value of X once more; this time it should be 25. Finally, resume execution of your program with @CONT.

When the End of Program message appears, enter @RESET * to delete the breakpoints. Then use @LIST again to verify that they no longer exist.

Adding Commands to Basic

Each time the C-64 operating system executes a Basic program statement, it jumps to the address stored in RAM locations 776 and 777. Debugger 64 changes the addresses in these locations so the operating system jumps to the debugger, rather than the normal Kernal ROM, to execute a statement.

When in use, Debugger 64 checks to see if the next statement is a debugger command and, if so, executes it. If not, it jumps to the Kernal ROM so the statement is executed normally by Basic.

I'll be happy to answer any questions you have about Debugger 64. Just enclose a self-addressed, stamped envelope with your inquiry. R

Michael Broussard is a systems engineer and freelance writer. He's also interested in cooking, music and reptiles, especially his red-footed tortoise, Jake. You can write to him at 13136 Lazy Glen Court, Herndon, VA 22071.

Table 1. *Debugger 64 commands.*

@HELP or **@?**: Displays a summary of all the Debugger 64 commands on the screen.

@TRON: Trace On. Displays each line number in reverse video before the line is executed, so you can trace the flow of your program.

@TROFF: Trace Off. Disables the line number tracing activated by @TRON.

@BREAK: Sets a program breakpoint. This command must be executed in Direct mode, and it must be followed by a line number.

For example, if you enter @BREAK 235, Debugger 64 will suspend execution before each statement in line 235 of your program. Then a break message will tell you at what line the break occurred. When your program has stopped at a breakpoint, you can list portions of it, display or change the values of variables, set more breakpoints, and so on.

@BREAK is an improvement over the standard Basic Stop command, because it lets you set breakpoints dynamically without altering your program.

@CONT: Resumes execution from a breakpoint. *Don't* try to use the *Basic* CONT command to continue execution from a Debugger 64 breakpoint! Similarly, executing @CONT when your program is not at a debugger breakpoint has unpredictable results.

As with the Basic CONT command, if you alter your program or encounter an error while execution is suspended, you can't continue execution, but must restart the program with the Run command.

@STEP: An alternative to @CONT. When your program is at a breakpoint, @STEP performs the next logical program statement, then suspends execution as if another @BREAK had been encountered. In this way, you can execute one statement at a time without having to set breakpoints at every line. Since @STEP is an alternative to @CONT, use it only when your program is stopped at a debugger breakpoint.

@LIST: Displays a list of all the breakpoints currently set.

@RESET: Clears a breakpoint. For example, @RESET 240 removes the breakpoint from line 240. Enter @RESET * to reset all the breakpoints at once.

@STACK: Displays all currently active Gosub invocations. If more than one Gosub is active on the stack, they're listed in order from the first to the most recent.

@OFF: Disables Debugger 64. After using this command, debugger commands won't work until you re-enable them by typing SYS 49152.

Listing 1. *Debugger 64 program.*

```
1 REM DEBUGGER 64 BY MICHAEL BR
  OUSSARD                :REM*51
90 FOR T=49152 TO 50824: READ D
   : S=S+D: POKE T,D:NEXT
                        :REM*216
93 IF S <> 178516 THEN PRINT"ER
   ROR IN DATA STATEMENTS":END
                         :REM*23
95 SYS 49152: NEW        :REM*29
100 DATA 76,21,192,173,77,192,1
    41,8,3,173,78,192,141,9,3,3
    2,115,0,76,174       :REM*96
110 DATA 167,173,9,3,201,167,24
    0,1,96,141,78,192,173,8,3,1
    41,77,192,169,79    :REM*242
120 DATA 141,8,3,169,192,141,9,
    3,32,50,194,169,0,141,30,19
    6,141,24,196,141      :REM*4
130 DATA 25,196,141,29,196,96,1
    73,31,196,133,122,173,32,19
    6,133,123,76,0,0    :REM*178
140 DATA 165,122,141,31,196,165
    ,123,141,32,196,173,30,196,
    208,3,76,167,192      :REM*4
150 DATA 165,58,201,255,208,3,7
    6,167,192,205,25,196,208,10
    ,165,57,205,24           :REM*68
160 DATA 196,208,3,76,167,192,1
    38,72,162,0,189,227,196,201
    ,47,240,15,201          :REM*214
170 DATA 92,240,6,32,210,255,23
    2,208,239,169,13,32,210,255
    ,104,170,166,57         :REM*166
180 DATA 142,24,196,165,58,141,
    25,196,32,205,189,169,13,32
    ,210,255,173,29          :REM*36
190 DATA 196,240,36,138,72,162,
    0,189,189,196,201,47,240,15
    ,201,92,240,6,32         :REM*50
200 DATA 210,255,232,208,239,16
    9,13,32,210,255,104,170,169
    ,0,141,29,196,76        :REM*164
210 DATA 224,192,165,57,141,27,
    196,165,58,141,28,196,32,64
    ,194,152,240,82         :REM*190
220 DATA 138,72,162,0,189,205,1
    96,201,47,240,15,201,92,240
    ,6,32,210,255           :REM*130
230 DATA 232,208,239,169,13,32,
    210,255,104,170,166,57,165,
    58,32,205,189           :REM*152
240 DATA 138,72,162,0,189,221,1
    96,201,47,240,15,201,92,240
    ,6,32,210,255           :REM*212
250 DATA 232,208,239,169,13,32,
    210,255,104,170,165,122,133
    ,61,165,123,133          :REM*18
260 DATA 62,165,57,133,59,165,5
    8,133,60,76,134,227,32,115,
    0,201,64,240,3          :REM*121
270 DATA 76,66,192,160,255,162,
    0,173,31,196,133,122,173,32
    ,196,133,123,32         :REM*213
280 DATA 115,0,200,185,35,196,2
    40,28,201,92,240,29,133,2,3
    2,115,0,240,17          :REM*239
290 DATA 197,2,240,235,200,185,
    35,196,201,92,208,248,232,2
    32,76,64,193,162        :REM*141
300 DATA 11,76,55,164,165,122,1
    41,31,196,165,123,141,32,19
    6,189,241,196,72        :REM*245
310 DATA 189,240,196,72,96,138,
    72,162,0,189,148,196,201,47
    ,240,15,201,92           :REM*11
320 DATA 240,6,32,210,255,232,2
    08,239,169,13,32,210,255,10
    4,170,186,134,2         :REM*131
330 DATA 162,255,189,0,1,201,14
    1,240,8,202,228,2,208,244,7
    6,89,192,138,72         :REM*171
340 DATA 232,232,232,189,0,1,13
    3,122,232,189,0,1,133,123,1
    38,72,162,0,189            :REM*9
350 DATA 169,196,201,47,240,15,
    201,92,240,6,32,210,255,232
    ,208,239,169,13          :REM*49
360 DATA 32,210,255,104,170,32,
    121,0,32,107,169,165,21,166
    ,20,32,205,189           :REM*43
370 DATA 138,72,162,0,189,177,1
    96,201,47,240,15,201,92,240
    ,6,32,210,255           :REM*105
380 DATA 232,208,239,169,13,32,
    210,255,104,170,104,170,72,
    232,189,0,1,141         :REM*133
390 DATA 26,196,232,189,0,1,174
    ,26,196,32,205,189,169,13,3
    2,210,255,104            :REM*21
400 DATA 170,76,175,193,169,1,1
    41,29,196,76,154,195,162,25
    5,169,0,157,136         :REM*131
410 DATA 198,202,208,250,141,23
    ,196,96,162,0,172,23,196,20
    0,136,208,1,96          :REM*225
420 DATA 189,136,198,205,27,196
    ,240,4,232,232,208,240,232,
    189,136,198,205         :REM*245
430 DATA 28,196,208,244,202,96,
    32,64,194,152,240,1,96,173,
    23,196,201,120           :REM*57
440 DATA 208,29,138,72,162,0,18
    9,114,196,201,47,240,15,201
    ,92,240,6,32,210         :REM*93
450 DATA 255,232,208,239,169,13
    ,32,210,255,104,170,96,162,
    0,172,23,196,208         :REM*21
460 DATA 17,173,27,196,157,136,
    198,232,173,28,196,157,136,
    198,238,23,196           :REM*65
470 DATA 96,232,232,136,208,251
    ,240,232,32,64,194,152,208,
    1,96,206,23,196         :REM*237
480 DATA 138,168,200,200,224,25
    2,208,1,96,185,136,198,157,
    136,198,232,200         :REM*133
490 DATA 76,185,194,32,115,0,14
    4,16,201,172,240,3,76,111,1
    93,32,50,194,32         :REM*129
500 DATA 115,0,76,174,167,32,12
    1,0,32,107,169,165,20,141,2
    7,196,165,21,141         :REM*59
510 DATA 28,196,32,171,194,76,1
    74,167,32,115,0,144,3,76,11
    1,193,32,107,169         :REM*67
520 DATA 165,20,141,27,196,165,
    21,141,28,196,32,97,194,76,
    174,167,172,23          :REM*190
530 DATA 196,208,31,138,72,162,
    0,189,133,196,201,47,240,15
    ,201,92,240,6,32         :REM*52
540 DATA 210,255,232,208,239,16
    9,13,32,210,255,104,170,76,
    128,195,138,72          :REM*206
550 DATA 162,0,189,81,196,201,4
    7,240,15,201,92,240,6,32,21
    0,255,232,208            :REM*26
560 DATA 239,169,13,32,210,255,
    104,170,162,0,169,32,32,210
    ,255,169,32,32           :REM*22
570 DATA 210,255,189,136,198,14
    1,26,196,232,142,33,196,140
    ,34,196,189,136          :REM*70
580 DATA 198,174,26,196,32,205,
    189,169,13,32,210,255,174,3
    3,196,172,34,196        :REM*208
590 DATA 232,136,208,209,32,115
    ,0,76,174,167,169,1,208,2,1
    69,0,141,30,196          :REM*44
600 DATA 169,0,141,24,196,141,2
    5,196,76,128,195,165,62,208
    ,34,138,72,162,0         :REM*38
610 DATA 189,97,196,201,47,240,
    15,201,92,240,6,32,210,255,
    232,208,239,169          :REM*74
620 DATA 13,32,210,255,104,170,
    32,115,0,76,174,167,165,61,
    133,122,141,31             :REM*6
630 DATA 196,165,62,133,123,141
    ,32,196,165,59,133,57,165,6
    0,133,58,76,50          :REM*210
640 DATA 193,138,72,162,0,189,6
    ,197,201,47,240,15,201,92,2
    40,6,32,210,255          :REM*58
650 DATA 232,208,239,169,13,32,
    210,255,104,170,138,72,162,
    0,189,255,197           :REM*210
660 DATA 201,47,240,15,201,92,2
    40,6,32,210,255,232,208,239
    ,169,13,32,210          :REM*236
670 DATA 255,104,170,32,115,0,7
    6,174,167,0,0,0,0,0,0,0,0
    ,0,0,0,66,82,69         :REM*178
680 DATA 65,75,92,82,69,83,69,8
    4,92,83,84,65,67,75,92,169,
    92,155,92,84,82          :REM*30
690 DATA 145,92,84,82,79,70,70,
    92,154,92,79,70,70,92,72,69
    ,76,80,92,153,92        :REM*226
700 DATA 0,18,66,82,69,65,75,83
    ,32,83,69,84,32,65,84,58,92
    ,18,67,65,78,39         :REM*130
710 DATA 84,32,67,79,78,84,73,7
    8,85,69,33,92,18,66,82,69,6
    5,75,32,84,65,66         :REM*50
720 DATA 76,69,32,70,85,76,76,3
    3,92,18,78,79,32,66,82,69,6
    5,75,83,32,83,69         :REM*30
730 DATA 84,92,18,42,42,42,32,8
    3,84,65,67,75,32,84,82,65,6
    7,69,32,42,42,42        :REM*162
740 DATA 92,18,71,79,83,85,66,3
    2,47,32,70,82,79,77,32,76,7
    3,78,69,32,47,18        :REM*198
750 DATA 32,42,42,42,32,83,84,6
    9,80,80,73,78,71,58,47,18,3
    2,42,42,42,32,66         :REM*12
760 DATA 82,69,65,75,32,73,78,3
    2,47,32,42,42,42,32,92,18,3
    2,42,42,42,32,76        :REM*104
770 DATA 73,78,69,58,32,47,243,
    194,200,194,134,193,41,194,
    14,195,133,195          :REM*193
780 DATA 137,195,153,195,2,192,
    216,195,216,195,13,18,32,32
    ,42,42,42,32,68         :REM*197
790 DATA 69,66,85,71,71,69,82,3
    2,67,79,77,77,65,78,68,32,8
    3,85,77,77,65,82        :REM*159
800 DATA 89,32,42,42,42,32,32,1
    3,64,84,82,79,78,32,32,32,3
    2,32,32,32,32,32        :REM*247
810 DATA 45,45,32,84,82,65,67,6
    9,32,79,78,13,64,84,82,79,7
    0,70,32,32,32,32          :REM*11
820 DATA 32,32,32,32,45,45,32,8
    4,82,65,67,69,32,79,70,70,1
    3,64,66,82,69,65        :REM*143
830 DATA 75,32,60,76,73,78,69,6
    2,32,45,45,32,83,69,84,32,6
    5,32,66,82,69,65        :REM*203
840 DATA 75,13,64,76,73,83,84,3
    2,32,32,32,32,32,32,32,32,4
    5,45,32,76,73,83        :REM*131
850 DATA 84,32,66,82,69,65,75,8
    3,13,64,82,69,83,69,84,32,6
    0,76,73,78,69,62         :REM*95
860 DATA 32,45,45,32,82,69,83,6
    9,84,32,49,32,66,82,69,65,7
    5,13,64,82,69,83         :REM*97
870 DATA 69,84,32,42,32,32,32,3
    2,32,32,45,45,32,82,69,83,6
    9,84,32,65,76,76        :REM*137
880 DATA 32,66,82,69,65,75,83,1
    3,64,67,79,78,84,32,32,32,3
    2,32,32,32,32,32           :REM*5
890 DATA 45,45,32,82,69,83,85,7
    7,69,32,69,88,69,67,85,84,7
    3,79,78,92,64,83        :REM*149
900 DATA 84,69,80,32,32,32,32,3
    2,32,32,32,32,45,45,32,83,8
    4,69,80,32,49,32        :REM*205
910 DATA 83,84,65,84,69,77,69,7
    8,84,13,64,83,84,65,67,75,3
    2,32,32,32,32,32        :REM*183
920 DATA 32,32,45,45,32,71,79,8
    3,85,66,32,83,84,65,67,75,3
    2,84,82,65,67,69        :REM*237
930 DATA 13,64,79,70,70,32,32,3
    2,32,32,32,32,32,32,32,45,4
    5,32,84,85,82,78         :REM*73
940 DATA 32,79,70,70,32,68,69,6
    6,85,71,71,69,82,13,64,72,6
    9,76,80,44,32,64        :REM*231
950 DATA 63,32,32,32,32,32,45,4
    5,32,67,79,77,77,65,78,68,3
    2,83,85,77,77,65         :REM*45
960 DATA 82,89,92,0         :REM*179
```

■

THE SPEECH-CONTROLLED 64

Voice commands to a Commodore can help physically disabled people do what their bodies forbid—from typing to driving a wheelchair.

By KENT PATTERSON

Eight. India. Space. Romeo. Uniform. November." Sounding almost like a computer herself, Bjo Ashwill talks to her C-64. As she speaks, the letters "HI RU N" appear on the monitor screen. "That's supposed to say 'HI RUN,'" Ashwill says. More letters appear. "Back up," she says. Nothing happens. "Back up!" she snaps, and the last letter disappears.

Typing letter by letter is a trial of patience, but Ashwill is strongly motivated to use this voice-recognition typing system. She suffers from rheumatoid arthritis, a painfully disabling condition that has twisted her hands almost beyond use. For most of us, typing is merely a dull job; for her, it's an ordeal.

When Ashwill first looked into voice recognition several years ago, the most commonly recommended system cost $15,000. Even at that price, it reportedly worked only half the time. Her present system includes a Covox Voice Master that plugs directly into her C-64 and cost her only $89. From $15,000 to $89 is a vast improvement, but the system's success rate in "understanding" her spoken commands is still only about 50 percent.

The Mysteries of the Brain

Several problems stand in the way of practical voice recognition. To analyze sound waves, a computer must "sample" the pitch and intensity of a sound at various instants. This is like mapping the ocean floor by taking soundings here and there. The more soundings the computer takes, the more accurately it can map the original sound. With sampling rates of, say, 10,000 times a second, the map is very accurate, but storing 10,000 numbers for a second of sound gobbles up a lot of memory. Because of their memory limitations, voice-recognition systems based on home computers are likely to be inaccurate and can handle only a limited vocabulary.

Another problem stems from the fact that speech is incredibly complex. Humans never say the same word in exactly the same way twice. How the brain decides that these different sounds are the same word is the first dark mystery of speech.

Bjo Ashwill speaks commands to her C-64, using Voice Master.

In addition, the brain listens for meaning. As you read this, various sound waves are probably hitting your ears—perhaps from a stereo, a dripping faucet and distant traffic—but your brain pays no attention. Let someone whisper your name, however, and you're all ears. How your brain decides which sounds deserve attention and which don't is the second dark mystery.

A personal computer system that could dependably recognize spoken words to do typing or any other of a myriad of tasks would be revolutionary. Imagine combining the loyalty, obedience and endless patience of Robbie the Robot with the language communication skills of Jeeves, P. G. Wodehouse's renowned butler. For those unable to type, dial a telephone or even turn on the lights or television set, an electronic Jeeves could mean liberation.

One Step Forward

Bjo Ashwill spends a lot of time writing. A counselor for the English and Performing Arts departments at Lane Community College in Eugene, Oregon, she estimates that writing is 20 percent of her work. This includes not only the usual barrage of interoffice paperwork, but also writing grant applications and video scripts for student orientation.

At home, she spends even more time on her Commodore. She produces *Writers in Waiting*, a newsletter for aspiring writers; she has written two books, several stories and routines for a local comedian; and she has won a contest for writing a play about physically disabled people.

It was writing the play that convinced her she needed a Commodore. "I had to get the thing typed, and I was up against a deadline," she says. "I thought a computer could make things a lot easier for me." It did.

Buying a C-64 and a word processing program, she eliminated hours of painful second- and third-draft typing. Ashwill now types rough drafts of her documents with her voice. Later, she loads the files created by the Covox VM into her Fleet System 2 word processor for editing—lots and lots of editing, for there are many mistakes.

Her goal of eliminating all manual typing, however, remains tantalizingly out of reach. Voice typing is inaccurate, and, even by the standards of a two-finger, hunt-and-peck typist, it's slow. Also, it's a real challenge to learn to speak so that the computer understands.

Ashwill struggles to train herself to speak with precision, saying the same word exactly the same way each time. Even after six months of hard work, the results are uneven. Sometimes the system works, though very slowly. At other times, there are more failures than suc-

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cesses. Any change in her voice from a head cold, fatigue, pain medication or emotional frustration hopelessly confuses the machine.

"It has enough bugs in it that I don't use it very much right now," Ashwill says. "But I know this can be a freeing thing. I would encourage all those plunkers or hackers or whatever they call themselves to jump on this bandwagon. I think they are very, very close to perfecting this. I'd love that!"

Tackling the Problem

So far, the hacking has been done by Mike Goldhammer, a good friend of Ashwill, with advice from Covox, which is located in Eugene. Goldhammer runs a one-man business as a consultant specializing in computers and the disabled. Himself disabled from birth, he uses a wheelchair and has little use of his hands. He's not a professional programmer, but he believes that the best way to get a job done is to do it yourself.

"Voice-recognition technology has always been too expensive for disabled people," he points out. "Now the technology is cheap enough, but we will have to make it useful ourselves." He considers his present program merely an experimental "hack," with Ashwill serving as friend, alpha tester, end user and chief critic.

Goldhammer believes that the final version of the program should be in machine language because, "Basic's too slow." Brad Stewart, Covox's vice president and program designer, agrees that a machine language version of Goldhammer's program would run faster. He also thinks a full-scale effort by professionals would help, although costs at the moment are prohibitive.

One of Covox VM's options (about $40 extra) is "James," an electronic butler of sorts. James uses a Commodore computer and remote switches to perform tasks such as turning lights on and off. With an autodialing modem, James can even dial the telephone.

Future products might include a tactile transducer to convert sound into vibrations so the deaf could "feel" speech. "We know how to do this," Stewart says, "but we just don't have the resources right now."

The Dysrhythmia Problem

In contrast to Stewart's buoyant optimism, several people have their doubts. One is Andrew Clement. Muscular dystrophy has left him with only enough strength to sit in a wheelchair, move his head and speak. He needs almost constant help from an attendant, but his sharp mind has made him a successful attorney.

"I use a computer for everything," he says. "Word processing, business, record keeping, even an occasional game."

Clement spent more than a thousand dollars for a voice-recognition system to control his computer, but to no avail. "The major problem is that anybody with a handicap often has multiple handicaps," Clement says. "One of mine is that my voice fluctuates. For example, I say the word 'I' differently every time." It took forever to "train" his computer to understand a command. "By the time I got the computer trained to do something, I didn't want to do it anymore," he says.

He currently uses a headstick and mouse to control his computer, but when asked if he'd buy a usable voice system, he says, "You bet!"

Fluctuating speech (also known as dysrhythmia) is a problem being addressed by Christopher Jenkins, a doctoral candidate in special education at the University of Oregon. He specializes in working with children who have multiple handicaps, and his goal is to "marry technology, motor training and the children's motivation to enable them to do more things."

As an experiment, Jenkins tried a Covox demonstration with youngsters who have cerebral palsy. The monitor's screen color was supposed to change on a spoken command, but they would say "green," and "red" would appear. According to Jenkins, "to be consistently useful, the system would have to be able to recognize speech with dysrhythmia." That's a tall order, especially if close to 100 percent reliability is needed.

"It's a mistake to assume that since the technology is available, it's automatically going to be applicable to the disabled," Jenkins says. A great deal of hard work and ingenuity is needed to "get at" whatever ability the disabled person has, and development costs are high.

"Our goal in everything we do is to enhance the ability of the person in the community to remain in the community," Jenkins says.

Unfortunately, with the vast development costs of specialized hardware and software, few companies can see much profit in a market as small as the disabled population. "If it's affordable, it hasn't been developed with the disabled in mind," Jenkins says. Fortunately, there are a few people willing to work on the problem without worrying about profit margins.

A Labor of Love

"Left," Marvin Greene says into a microphone. Growling fiercely, a toy tank turns left. "Forward." The tank crawls forward. Instead of a gun, the tank has an arm with a mechanical claw in front. "Arm." The arm lowers. "Claw." The claw grasps the edge of a box. "Reverse." Nothing. "Reverse!" Still nothing. Its claw wedged in the corner of the box, the tank sits helplessly immobile. "Still a few bugs," Greene says with a smile.

Greene is a senior in special education and computer science at Oregon State University. His major interests are robotics and artificial intelligence, and he's designed a computer/radio control interface that plugs into the Commodore joystick port. A Covox Voice Master controls the computer, the computer controls the radio, and the radio controls the tank.

"A handicapped person could use something like this to control a microwave oven," Greene says, "or a wheelchair." He remembers seeing a voice-controlled wheelchair on television that cost more than $50,000. "With a car battery, a C-64 and a Covox, you could do the same for about five hundred dollars," he says.

Richard Tutley, the owner of the toy tank, is a research associate in an Oregon State plant physiology lab that uses Commodores for data collection. Experimenting with sound, he's working on a Commodore-Covox combination to replace expensive laboratory equipment used in speech therapy. He estimates it will take about a year of weekends and evenings to create the machine language program he has in mind. "I wouldn't mind making some money," he says, "but mostly it's a labor of love."

Goldhammer, Greene, Tutley and dozens of others are working without much concern for balance sheets or even credit. In some ways, voice recognition in 1987 is precisely where personal computers were in 1977—promising but not quite practical. Yet, it would be wrong to say that voice recognition hasn't brought any changes.

Ask Bjo Ashwill. "Rheumatoid arthritis is a progressively crippling disease. It goes up; it goes down. Typically, rheumatoid arthritics end up going from walking to wheelchair to bed. It can get really nasty."

With this potential fate hanging over her head, Ashwill freely admits she's frightened. "What if I get so bad I can no longer work?" she asks. "What if I become bedridden, which is a distinct possibility? I can't stop writing. That's my love and my life."

Slow and primitive as her voice typewriter is, at least it will let Bjo Ashwill pursue her love. ■

Kent Patterson is a freelance writer who has written two software manuals and several articles on computer topics. Disabled himself, he has a special interest in computers and the disabled. Address correspondence to him at 735 East 17th, Apt. 22, Eugene, OR 97401.

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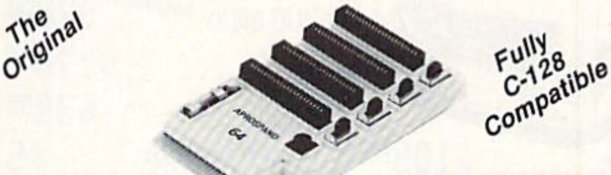

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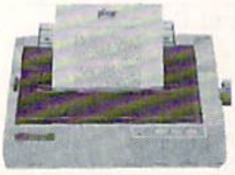

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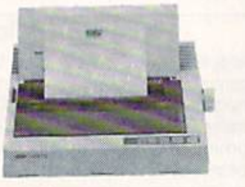

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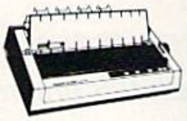

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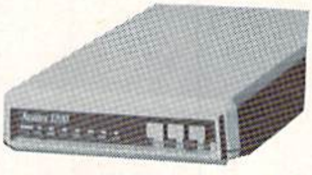

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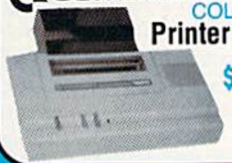

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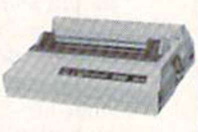

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POWER KEY

Entering Basic commands is just one key away with this programming utility that assigns special roles to the function and control keys.

By JOHN RYAN

Like many other C-64 owners, my collection of programming utilities has grown considerably over the years. Unfortunately, most of my Basic utilities are not tailored to meet my specific needs; I'm left at the mercy of the author's own idea of what a utility should and should not do.

I wrote the Power Key program to help me design a utility that meets *my* needs, not those of someone else. It provides one-key entry of Basic keywords, plus other commands that perform various screen and editing functions.

Power Key lets you assign up to 16 Basic keywords to the function keys on your C-64; or you can choose the program's Default option, which assigns pre-defined keywords to the function keys. As a bonus, a number of functions that enhance the control key are also included.

Using Power Key

After loading Power Key, type SYS 49152 to run the editor portion of the program, where you can customize it as you wish. You're given the two options of assigning the default keywords or your own.

If you choose the Default option, Power Key assigns the two sets of Basic keywords in Table 1 to the function keys. If you choose to define your own, Power Key prints the name of the function key and prompts you to enter a Basic keyword. Since Basic 2.0 keywords can be no more than six characters in length, Power Key reads only the first six characters of your input.

To keep the program short, I've included no check for spelling, so be sure that each keyword you enter is spelled correctly. Otherwise, it will cause a syntax error when used in your program.

Once you've assigned the keywords, you can save them to disk as a small machine language file under a filename of your choice. After saving the file, you're given the option to create another file. If you answer yes, the process of assigning keywords repeats. If you answer no, the program exits to Basic. Should you choose to create several files with many different keywords, I suggest writing the filenames and their function key definitions on 5-by-7 cards for reference.

Programming with Power Key

Using Power Key in your own Basic programming is easy. Don't load the main Power Key program (Listing 1). Instead, load one of the files you've created with the program. Use the syntax LOAD "filename",8,1 for this operation.

After the file has loaded, type NEW to reset the Basic pointers, and enter SYS 49662. Power Key will then be activated, along with the following key functions:

F1–F8: Print Basic keywords.

Commodore key: Toggles the computer between the two sets of Basic keywords. When you initially activate a Power Key file, keyword set #1 is active. Press the Commodore key to access the second set, and press it again to change back to the first.

Control/B: Changes the border color.

Control/S: Changes the screen color.

Control/L: Changes the color of every character on the screen.

Control/E: Escapes Quote mode. Control-E is the only function that works while the computer is in Quote mode, deactivating it if you need to use Power Key functions. It provides a way to enter keywords assigned to the F1–F8 keys and control/color combinations within Basic strings.

Holding down the control key: Freezes the C-64's time clock and suspends the execution of a Basic or machine language program until the key is released. This function is useful for examining Basic program listings, or for examining screen displays during a program's execution. The Commodore key can be used in a similar manner, but it toggles the keyword set each time it's pressed.

To exit Power Key, press the run-stop/restore key combination.

Table 1. *Lists of default keywords.*

SET #1	SET #2
F1 LIST	F1 DATA
F2 GOTO	F2 READ
F3 GOSUB	F3 THEN
F4 RETURN	F4 NEXT
F5 PRINT	F5 RIGHT$
F6 REM:	F6 LEFT$
F7 POKE	F7 LOAD
F8 PEEK	F8 SAVE

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If a function key has been pressed, the program attempts to match the key's ASCII value with values stored in a reference table in memory. When a match is found, a Basic keyword is printed; otherwise normal program control continues.

If you've pressed the control or Commodore key at location 653, Power Key either performs a screen function or toggles the keyword set, depending on which key you pressed. A value of 2 represents the Commodore key; a value of 4, the control key. You can include the statement X = PEEK(653):PRINT X in your Basic programs to determine if either the shift, control or Commodore key has been pressed.

Address all author correspondence to John V. Ryan, PO Box 5786, APO NY 09179.

Listing 1. *Power Key program.*

```
5 REM POWERKEY 64 BY JOHN RYAN
                          :REM*19
10 PRINT"{SHFT CLR}READING DATA
   ...":I=49152           :REM*92
20 READ A:IF A=256 THEN END
                         :REM*182
30 POKE I,A:I=I+1:GOTO 20
                         :REM*212
40 DATA 32,187,193,169,12,141,3
   3,208,141,32,208,169,0,141,1
   34,2,169,2            :REM*194
50 DATA 141,171,2,160,0,140,172
   ,2,162,8,169,133,141,174,2,1
   72,172,2                :REM*2
60 DATA 173,174,2,153,166,196,3
   2,244,193,238,174,2,202,208,
   238,169,64            :REM*100
70 DATA 141,172,2,206,171,2,208
   ,221,169,1,141,172,2,162,0,1
   72,172,2              :REM*164
80 DATA 189,62,196,240,24,201,2
   55,240,8,153,166,196,200,232
   ,76,71,192              :REM*6
90 DATA 169,0,153,166,196,32,24
   4,193,232,76,68,192,169,0,15
   3,166,196              :REM*78
100 DATA 169,240,32,193,193,32,
    228,255,240,251,201,49,208,
    3,76,254,192           :REM*6
110 DATA 201,50,208,240,32,187,
    193,169,243,32,193,193,169,
    247,32,193           :REM*232
120 DATA 193,169,2,141,176,2,16
    9,1,141,172,2,24,162,5,160,
    0,32,240,255         :REM*154
130 DATA 162,8,160,0,185,30,196
    ,240,7,32,210,255,200,76,16
    1,192,200             :REM*16
140 DATA 140,178,2,169,0,141,17
    3,2,172,172,2,32,207,255,15
    3,166,196            :REM*206
150 DATA 201,13,240,14,200,238,
    173,2,173,173,2,201,6,240,3
    ,76,185,192          :REM*134
160 DATA 169,13,32,210,255,169,
    0,153,166,196,32,244,193,20
    2,224,0,240           :REM*14
170 DATA 6,172,178,2,76,161,192
    ,206,176,2,240,16,32,187,19
    3,169,243,32         :REM*156
180 DATA 193,193,169,248,32,193
    ,193,76,149,192,32,187,193,
    169,245,32            :REM*66
190 DATA 193,193,169,0,141,175,
    2,32,228,255,240,251,201,84
    ,208,5,162,1         :REM*244
200 DATA 76,34,193,201,68,208,2
    38,238,175,2,162,8,169,0,16
    0,255,32,186         :REM*102
210 DATA 255,32,187,193,169,242
    ,32,193,193,160,0,32,207,25
    5,153,188,2          :REM*166
220 DATA 201,13,240,4,200,76,51
    ,193,192,0,240,231,152,162,
    188,160,2,32          :REM*38
230 DATA 189,255,173,175,2,240,
    15,32,187,193,169,241,32,19
    3,193,32,228         :REM*104
240 DATA 255,201,13,208,249,24,
    162,4,160,6,32,240,255,169,
    254,133,251          :REM*210
250 DATA 169,193,133,252,162,38
    ,160,197,169,251,32,216,255
    ,165,144,240         :REM*226
260 DATA 3,76,154,193,32,187,19
    3,169,244,32,193,193,32,228
    ,255,240,251          :REM*93
270 DATA 201,89,208,3,76,0,192,
    201,78,208,240,96,169,147,3
    2,210,255             :REM*77
280 DATA 169,1,141,134,2,162,2,
    160,2,24,32,240,255,162,0,1
    89,38,195            :REM*135
290 DATA 240,7,32,210,255,232,7
    6,174,193,96,169,147,32,210
    ,255,96,160           :REM*31
300 DATA 0,141,170,2,185,75,195
    ,205,170,2,240,4,200,76,198
    ,193,200,185         :REM*121
310 DATA 75,195,170,200,140,171
    ,2,185,75,195,168,24,32,240
    ,255,172,171         :REM*253
320 DATA 2,200,185,75,195,240,7
    ,32,210,255,200,76,231,193,
    96,24,173            :REM*187
330 DATA 172,2,105,8,141,172,2,
    96,120,169,32,141,20,3,169,
    194,141,21,3         :REM*103
340 DATA 169,1,141,208,2,88,96,
    162,255,142,171,2,162,255,2
    02,208,253            :REM*89
350 DATA 206,171,2,208,246,96,7
    2,152,72,138,72,173,141,2,2
    01,4,208,13          :REM*133
360 DATA 165,203,201,14,208,7,1
    69,0,133,212,76,123,194,165
    ,212,240,3            :REM*41
370 DATA 76,123,194,173,141,2,2
    01,4,240,115,201,2,240,82,1
    65,203,201           :REM*137
380 DATA 64,240,42,141,209,2,17
    3,141,2,201,1,208,10,160,8,
    169,16,141            :REM*81
390 DATA 167,2,76,108,194,160,0
    ,169,8,141,167,2,185,149,19
    6,205,209,2          :REM*169
400 DATA 240,15,200,200,204,167
    ,2,208,241,104,170,104,168,
    104,76,49            :REM*215
410 DATA 234,200,185,149,196,14
    1,209,2,32,135,234,165,203,
    201,64,208           :REM*149
420 DATA 247,173,208,2,201,1,24
    0,110,76,3,195,173,208,2,20
    1,1,208,6             :REM*29
430 DATA 238,208,2,76,173,194,2
    06,208,2,32,135,234,173,141
    ,2,201,2,240         :REM*195
440 DATA 246,76,123,194,32,135,
    234,173,141,2,201,4,208,183
    ,165,203,201         :REM*239
450 DATA 13,208,9,238,33,208,32
    ,16,194,76,186,194,165,203,
    201,28,208,9         :REM*167
460 DATA 238,32,208,32,16,194,7
    6,186,194,201,42,208,212,23
    8,134,2,173          :REM*149
470 DATA 134,2,162,0,157,0,216,
    157,0,217,157,0,218,157,0,2
    19,232,208            :REM*57
480 DATA 241,32,16,194,76,186,1
    94,162,64,76,10,195,162,0,1
    89,166,196            :REM*21
490 DATA 205,209,2,240,4,232,76
    ,10,195,232,189,166,196,240
    ,7,32,210              :REM*3
500 DATA 255,232,76,23,195,76,1
    23,194,32,62,62,62,62,62,62
    ,62,62,62,62         :REM*159
510 DATA 62,32,83,65,86,69,32,6
    9,82,82,79,82,33,32,60,60,6
    0,60,60,60            :REM*97
520 DATA 60,60,60,60,60,0,240,1
    ,4,49,61,65,83,83,73,71,78,
    32,68,69,70           :REM*80
530 DATA 65,85,76,84,32,32,50,6
    1,68,69,70,73,78,69,32,75,6
    9,89,83,0             :REM*74
540 DATA 243,1,5,69,78,84,69,82
    ,32,66,65,83,73,67,32,75,69
    ,89,87,79,82         :REM*122
550 DATA 68,32,70,79,82,32,70,4
    9,45,70,56,0,245,1,8,83,65,
    86,69,32,84           :REM*48
560 DATA 79,32,18,84,146,65,80,
    69,32,79,82,32,18,68,146,73
    ,83,75,63,0           :REM*54
570 DATA 242,3,6,70,73,76,69,32
    ,78,65,77,69,63,0,244,2,7,6
    7,82,69,65            :REM*40
580 DATA 84,69,32,65,78,79,84,7
    2,69,82,32,70,73,76,69,63,3
    2,40,89,47           :REM*130
590 DATA 78,41,0,241,2,5,73,78,
    83,69,82,84,32,68,73,83,75,
    32,65,78,68          :REM*196
600 DATA 32,80,82,69,83,83,32,1
    8,82,69,84,85,82,78,146,0,2
    47,23,13,75           :REM*92
610 DATA 69,89,87,79,82,68,32,8
    3,69,84,32,35,49,0,248,23,1
    3,75,69,89           :REM*114
620 DATA 87,79,82,68,32,83,69,8
    4,32,35,50,0,70,49,61,0,70,
    51,61,0,70           :REM*152
630 DATA 53,61,0,70,55,61,0,70,
    50,61,0,70,52,61,0,70,54,61
    ,0,70,56,61          :REM*150
640 DATA 0,76,73,83,84,255,71,7
    9,83,85,66,255,80,82,73,78,
    84,255,80,79          :REM*20
650 DATA 75,69,255,71,79,84,79,
    255,82,69,84,85,82,78,255,8
    2,69,77,58            :REM*72
660 DATA 255,80,69,69,75,255,68
    ,65,84,65,255,84,72,69,78,2
    55,82,73,71           :REM*94
670 DATA 72,84,36,255,76,79,65,
    68,255,82,69,65,68,255,78,6
    9,88,84,255            :REM*8
680 DATA 76,69,70,84,36,255,83,
    65,86,69,0,4,133,5,134,6,13
    5,3,136,4             :REM*54
690 DATA 137,5,138,6,139,3,140,
    256                  :REM*104
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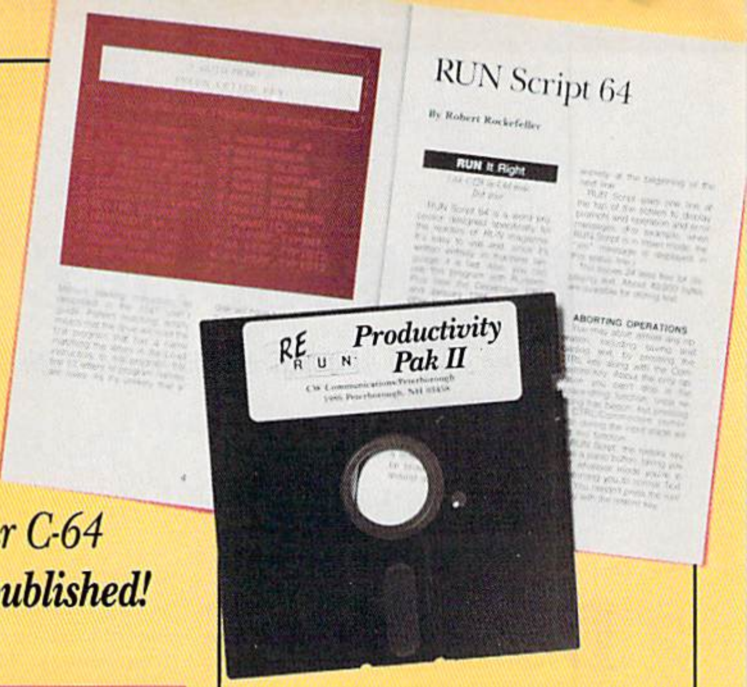
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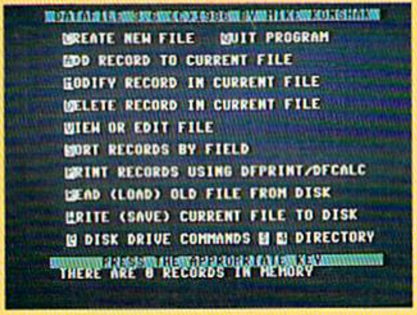

```
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MODIFY RECORD IN CURRENT FILE
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VIEW OR EDIT FILE
SORT RECORDS BY FIELD
PRINT RECORDS USING DFPRINT/DFCALC
READ (LOAD) OLD FILE FROM DISK
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PRESS THE APPROPRIATE KEY
THERE ARE 0 RECORDS IN MEMORY
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DRUMMODORE

Rattle the snares and thump the basses with your C-64 drum machine.

By LARRY COTTON

Drum machines, digital devices that simulate the sounds of percussion instruments, are fast becoming popular with both professional and amateur musicians. The sounds are encoded on ROM chips, so the "drummer" has only to tap a few keys on the keyboard to sound like a studio musician.

I wrote Drum Machine, the program in Listing 1, to emulate commercial drum machines. It demonstrates basic features of the more sophisticated products and will let you create some drum music of your own. With it, you can record and play sequences of drum beats, edit them, vary their tempos, place them in continuous loops and save them to and load them from disk.

Although the program is written completely in Basic, it can play a sequence accurately and quickly. I achieved the speed by assigning letter names to constants and by keeping the main recording and playing loop compact. I used the C-64's built-in TI function (not For/Next loops) to create accurate beat durations.

The Menu

Type in and save Drum Machine to disk. When you run it, a menu (see the photo) listing all the sounds the program will make, plus the program functions, will appear on the screen. To produce a sound or access a function, just press the appropriate key.

The first group of menu items includes the nine percussion sounds and an asterisk. The asterisk is used to define loop sequences, as I will describe later.

Summaries of the function key commands appear next. There are nine of them, instead of the eight you might expect, because F5 toggles between the Play and Stop modes.

The return key erases the sequence you're working on so you can start over from scratch. This function includes a safety message, so if you hit return by mistake or change your mind about starting over, you can stop the erasure.

The next two items on the menu screen let you change the tempo of a sequence and choose the program mode you want to work in. One more item, which counts the number of beats in a sequence, appears on the menu screen when you access Record or Play mode.

Practicing

All the sounds are produced with eight of the bottom-row keys and the space bar. You'll find it easiest to play with the fingers of your left hand on keys Z through V, the fingers of your right hand on B through < and your thumbs on the space bar.

The program starts off in Practice mode, where the sounds don't get recorded. Practice awhile to get used to the sounds and the almost imperceptible lag between pressing a key and hearing it. When you're recording, you'll have to ignore this lag, because if you wait for the computer to "catch up," you'll find yourself playing slower and slower.

Stay in Practice mode until you get the sequence the way you want it; then press F1 to record.

Recording

In Record mode, when you press the first sound key, the timer will start and keep running as long as you're in that mode. Because it keeps running, if you pause after a beat, the computer will think that beat is a very long one. Then, when you play the sequence back, the computer will seem to get stuck, producing no sounds, while it waits for the "long" beat to end. To fix a situation like this, you have to edit the long beat out; see the editing instructions below.

In contrast to some professional drum machines, my program can produce only one sound at a time, and there's no provision for varying the duration of a beat. The maximum number of beats you can record is 500, but there's no signal when you pass the limit.

To increase or decrease the tempo of a sequence, press F3 or F4, keeping in mind that the beats will start to run together at about 30. It's best to record at tempo 10. If you have a difficult sequence to record, try pressing the keys slowly, then speeding up the tempo using F3.

To listen to your sequence at any point, press F5, for Play mode. After the entire sequence has played through, the computer will automatically switch back to Record mode, where you can add more beats or edit what you've already got.

You can halt a playing sequence by tapping F5 again to place the computer in Stop mode. Then, from Stop mode, you can access other functions by pressing the appropriate key, or return to playing—from the beginning of the sequence—by pressing F5 yet again. Any sounds you play in Stop mode won't be recorded.

Pressing F7 or F8 lets you load a sequence from disk or save it to disk. When loading, be sure to type the sequence's name exactly as you saved it.

Editing

To edit a sequence, you must be in either Record or Stop mode. The only way to make changes is to press F6 to back up through the sequence, erasing beats as you go. Then you can add on

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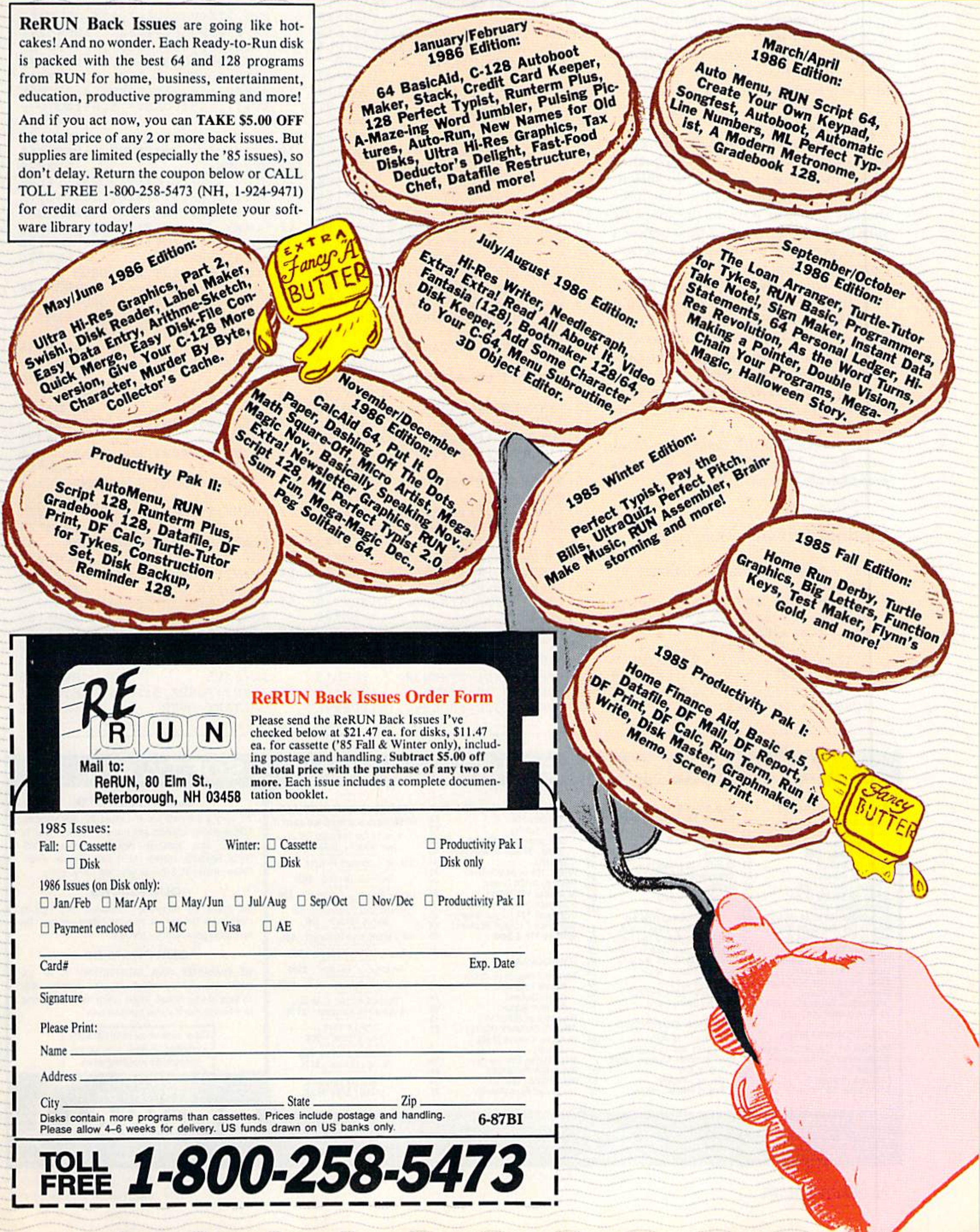

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replacements as you wish.

Because this is Drum Machine's only editing feature, if you want to make a change near the beginning of a long sequence, it's easiest to just hit return and start over. It's even better to edit a sequence in small chunks as you go along, so you don't have to make changes a long way back.

Defining Loops

You can use Drum Machine to accompany other music by placing a sequence in a continuous loop. You do this in Record mode by pressing the * key after the last beat you want in the loop. Be sure to allow an instant of time between the last beat and hitting the * key, so you don't cut the last beat short.

Once you've flagged the end of the loop with an *, the only way to add to it is to edit out the flag. Probably the minimum you'd want for a continuous loop sequence would be one bass drum beat and one snare drum beat.

So, now you're ready to be a percussionist with your new drum machine. R

Larry Cotton (3513 Canterbury Road, New Bern, NC 28560) plays keyboards professionally on nights and weekends.

Listing 1. *Drum Machine program.*

```
1 REM DRUM MACHINE BY LAWRENCE
  COTTON                   :REM*9
2 F5=135:T=64:SP=60:VL=54296:SH
  =653:C=1:J=2:RP=49:FK=7:X=211
  :Y=214:X1=20:Y1=22      :REM*78
3 P1=240:P2=241:P3=242:P4=243:D
  E=1:NK=64:KB=197:V=54272:V1=V
  +1:VO=79:W1=129         :REM*159
4 POKE53280,12:POKE53281,0:PRIN
  TCHR$(5):GOSUB43        :REM*10
5 DIMF1(T),Z(T),H(500),N(500)
                          :REM*121
6 A$(1)="RECORD{2 SPACEs}":A$(2
  )="PRACTICE":A$(3)="FAST{4 SP
  ACEs}":A$(4)="SLOW{4 SPACEs}"
                          :REM*98
7 A$(5)="STOP{4 SPACEs}":A$(6)=
  "REPEAT{2 SPACEs}":A$(7)="PLA
  Y{4 SPACEs}":A$(8)="BACK UP "
                          :REM*27
8 F1(12)=255:Z(12)=1      :REM*114
9 F1(23)=27:Z(23)=1       :REM*191
10 F1(20)=5:Z(20)=1       :REM*104
11 F1(36)=255:Z(36)=2     :REM*197
12 F1(31)=255:Z(31)=3     :REM*136
13 F1(28)=25:Z(28)=4      :REM*139
14 F1(39)=255:Z(39)=5     :REM*164
15 F1(60)=0:Z(60)=6       :REM*109
16 F1(47)=255:Z(47)=7     :REM*212
17 FORT=VTOV+24:POKET,0:NEXT:PO
   KEV+5,12:POKEV+6,39:POKEV+3,
   8                      :REM*155
18 POKEV+12,12:POKEV+13,21:POKE
   V+19,12:POKEV+20,19 :REM*230
19 T=36:GOSUB24:T=31:GOSUB24:T=
   28:GOSUB24:GOSUB42:POKEV+24,
   VO                     :REM*203
20 T=PEEK(KB):IFT=NKTHEN20
                          :REM*190
21 IFT<FKTHENSK=PEEK(SH):GOTO61
                          :REM*155
22 IFSE=1THENGOSUB41      :REM*98
23 GOSUB24:GOTO20         :REM*23
24 POKEV1,F1(T):POKEV+4,W1:ONZ(
   T)GOTO25,26,27,28,29,32,35
                          :REM*74
25 POKEV+23,P1:FORD=1TO20:NEXT:
   GOTO38                 :REM*37
26 POKEV+23,P1:FORD=1TO5:POKEV1
   ,0:FORG=1TO20:NEXT:POKEV1,F1
   (T):NEXT:GOTO38        :REM*42
27 POKEV+23,P2:FORU=1TO60STEP4:
   POKEV1,U:NEXT:GOTO38 :REM*33
28 POKEV+23,P1:POKEV+4,65:FORQ=
   40TO10STEP-6:POKEV1,Q:NEXT:G
   OTO38                  :REM*36
29 POKEV+23,P3:POKEV1,100:POKEV
   1+14,45:POKEV+4,21:POKEV1+7,
   0:FORD=1TO20:NEXT      :REM*249
30 IFPEEK(KB)=TTHEN30     :REM*8
31 POKEV+4,20:RETURN      :REM*99
32 POKEV+23,P1:POKEVL,16:POKEVL
   ,VO:POKEV1,2:POKEV+4,65:POKE
   V+4,64                 :REM*232
33 IFPEEK(KB)=SPTHEN33 :REM*231
34 RETURN                 :REM*92
35 POKEV+23,P1:POKEV+11,129:POK
   EV1,210:POKEV1+7,220:POKEV1+
   14,230:POKEV+4,33      :REM*241
36 POKEV+18,33:POKEV1,225:POKEV
   1+7,235:POKEV1+14,245:POKEV1
   ,210:POKEV1+7,220      :REM*84
37 POKEV1+14,230:POKEV+4,32:POK
   EV+11,128:POKEV+18,64:GOTO39
                          :REM*223
38 POKEV+4,W1-1           :REM*108
39 IFPEEK(KB)=TTHEN39     :REM*161
40 RETURN                 :REM*98
41 H(C-1)=TI:N(C)=T:POKEY,Y1:PR
   INT:POKEX,X1:PRINTC:C=C+1:TI
   $="000000":RETURN      :REM*243
42 POKEY,20:PRINT:POKEX,8:PRINT
   "MODE: "A$(J):RETURN:REM*162
43 PRINTCHR$(147)         :REM*75
44 POKEX,8:PRINT"Z - DRUM 1
                          :REM*74
45 POKEX,8:PRINT"X - DRUM 2
                          :REM*75
46 POKEX,8:PRINT"C - DRUM 3
                          :REM*38
47 POKEX,8:PRINT"V - CYMBAL
                          :REM*135
48 POKEX,8:PRINT"B - SNARE
                          :REM*128
49 POKEX,8:PRINT"N - COW BELL
                          :REM*231
50 POKEX,8:PRINT"M - SNARE ROLL
                          :REM*60
51 POKEX,8:PRINT"< - TAMBOURINE
                          :REM*245
52 POKEX,8:PRINT"* - END SEQUEN
   CE                     :REM*24
53 POKEX,8:PRINT"SPACE BAR - BA
   SS                     :REM*251
54 PRINT:POKEX,8:PRINT"F1/2 - R
   ECORD/PRACTICE         :REM*172
55 POKEX,8:PRINT"F3/4 - TEMPO F
   AST/SLOW               :REM*169
56 POKEX,8:PRINT"F5/6 - PLAY-ST
   OP/BACK UP             :REM*80
57 POKEX,8:PRINT"F7/8 - DISK LO
   AD/SAVE                :REM*235
58 PRINT:POKEX,8:PRINT"RETURN T
   O START OVER           :REM*24
```

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59 PRINT:POKEX,8:PRINT"TEMPO:":
   GOSUB80                 :REM*207
60 RETURN                  :REM*118
61 POKE198,0:IFT=0THEN20
                           :REM*187
62 ONTGOTO81,20,63,77,87,90
                           :REM*180
63 IFSK=1THEN70            :REM*201
64 SN$="":PRINTCHR$(147):POKEY,
   10:PRINT:POKEX,3:INPUT"SEQUE
   NCE TO LOAD";SN$        :REM*226
65 IFSN$=""THENGOSUB43:GOSUB42:
   IFSE=1THENGOSUB102      :REM*237
66 IFSN$=""THEN20          :REM*236
67 OPEN1,8,0,SN$           :REM*103
68 INPUT#1,C:FORT=1TOC-1:INPUT#
   1,N(T):INPUT#1,H(T):NEXT
                           :REM*90
69 CLOSE1:GOSUB43:J=1:GOSUB42:G
   OSUB102:SE=1:GOTO20     :REM*223
70 IFC=1THEN20             :REM*20
71 SN$="":PRINTCHR$(147):POKEY,
   10:PRINT:POKEX,3:INPUT"SEQUE
   NCE TO SAVE";SN$        :REM*95
72 IFSN$=""THENGOSUB43:GOSUB42:
   IFSE=1THENGOSUB102      :REM*244
73 IFSN$=""THEN20          :REM*243
74 OPEN1,8,1,SN$           :REM*238
75 PRINT#1,C:FORT=1TOC-1:PRINT#
   1,N(T):PRINT#1,H(T):NEXT
                           :REM*217
76 CLOSE1:GOSUB43:GOSUB42:IFSE=
   1THENGOSUB102:GOTO20    :REM*42
77 IFSK=1THENSE=0:J=2:GOSUB42:P
   OKEY,Y1:PRINT:POKEX,8:PRINT"
   {16 SPACES}"            :REM*79
78 IFSK=1THEN20            :REM*210
79 SE=1:J=1:GOSUB42:GOSUB102:GO
   TO20                    :REM*41
80 POKEY,18:PRINT:POKEX,14:PRIN
   TINT(DE*10)"{CRSR LF} ":RETU
   RN                      :REM*216
81 PRINTCHR$(147):POKEY,10:PRIN
   T:POKEX,2               :REM*85
82 PRINT"STARTING OVER ERASES Y
   OUR SEQUENCE.           :REM*124
83 PRINT:POKEX,2:PRINT"ARE YOU
   SURE YOU WANT TO START OVER?
                           :REM*175
84 GETA$:IFA$=""THEN84     :REM*164
85 IFA$="Y"THENRUN         :REM*245
86 GOSUB43:GOSUB42:IFSE=1THENGO
   SUB102:POKEX,X1:PRINT"{CRSR
   UP}"C-1:GOTO20          :REM*188
87 IFPEEK(SH)=1THENDE=DE-.1:IFD
   E<0THENDE=0             :REM*87
88 IFPEEK(SH)=0THENDE=DE+.1:GOS
   UB80:GOTO20             :REM*178
89 GOSUB80:GOTO20          :REM*73
90 IFSK=1THEN99            :REM*248
91 IFC=1THEN20             :REM*41
92 J=7:GOSUB42:GOSUB102    :REM*6
93 FORW=1TOC-1:GETA$:IFA$=CHR$(
   F5)THENJ=5:SE=0:GOSUB42:GOTO
   20                      :REM*231
94 T=N(W):IFT=RPTHEN93     :REM*190
95 POKEY,Y1:PRINT:POKEX,20:PRIN
   TW"{CRSR LF} "          :REM*65
96 TI$="000000":GOSUB24    :REM*60
97 IFH(W)>TI*DETHEN97      :REM*75
98 NEXT:J=1:SE=1:GOSUB42:GOTO20
                           :REM*234
99 IFC=1THEN20             :REM*49
100 J=8:SE=0:GOSUB42:H(C-2)=0:C
    =C-1:IFC<1THENC=1      :REM*30
101 GOSUB24:TI$="000000":POKEY,
    Y1:PRINT:POKEX,20:PRINTC-1"
    {CRSR LF} ":GOTO20     :REM*21
102 POKEY,Y1:PRINT:POKEX,8:PRIN
    T"BEAT NUMBER:":RETURN
                           :REM*190
```

■

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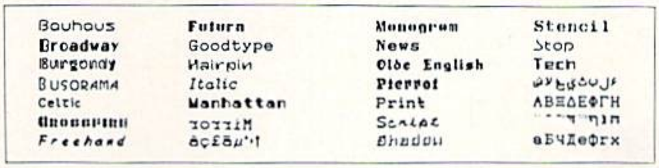

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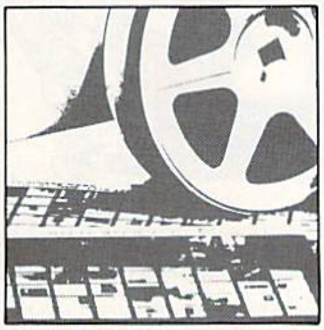

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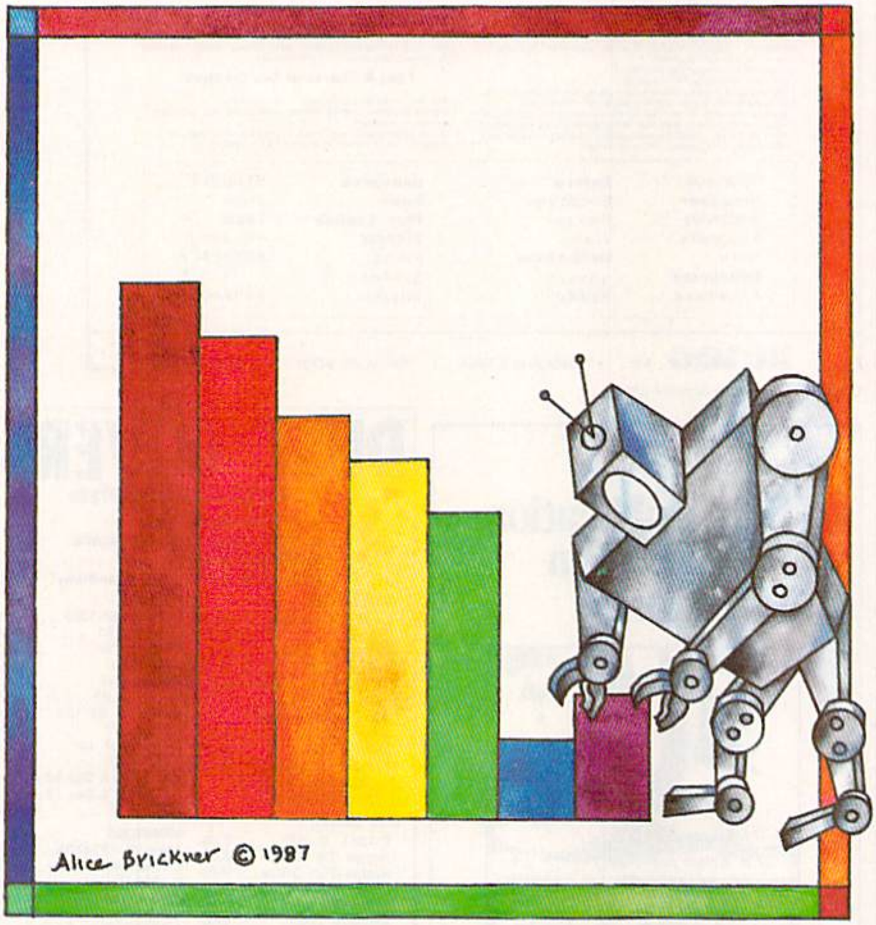
ROBOTGRAPH

Young computerists will have fun learning about bar graphs with this animated program.

By RICK KEPHART



Robotgraph is a "multimedia" program I designed to help children in the middle grades learn how to use bar graphs. The program's animation will capture the youngsters' attention, and the sound will reinforce the relationship between the value of each bar and its height.

When you run Robotgraph (Listing 1), it first sets up a horizontal x-axis, labeled A through H, and a vertical y-axis, labeled 1 through 10. The bars, A–H, will extend up from the x-axis to values measured on the y-axis.

Next, the program requests a value for the first bar, A. You can enter any whole number from 0 through 10 or any half-value in between, written in decimal form.

After you enter a valid number, a beeping robot descends from the top of the screen, and as it reaches the x-axis, it stops and extends a claw. The robot uses the claw to "lift" the bar representing the value you typed in up to the correct height. The growth of the bar is marked by a tone at each increment of one.

When the bar is complete, the robot retracts its claw and disappears off the top of the screen. Then Robotgraph requests a value for the next bar and repeats the process until eight different colored bars have been drawn.

You can review the value of each bar by pressing the letter corresponding to that bar. Pressing the return key will set up a new graph.

To examine the sprites responsible for the animation, use the following procedure. First, load and run the program normally, inputting any valid value for A. As soon as the robot is about halfway down the screen, hit the run-stop key to halt execution. (Don't hit the run-stop and restore keys together.)

Now press shift/clr-home to clear the screen of all but the robot, and, with the cursor at the top of the screen, type POKE B, followed by a number from 200 through 210 (the block numbers). POKE B,200 and POKE B,201 will display the two sprites used for the descent and ascent animation. POKE B,202 through POKE B,209 will display the sprites in the arm-out animation (or arm-in, in the reverse order). POKE B,209 and POKE B,210 will display the two sprites used for the ascend-with-arm-out animation. R

Address all author correspondence to Rick Kephart, 1 High St., Malvern, PA 19355.

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C-64

ILLUSTRATED BY ALICE BRICKNER

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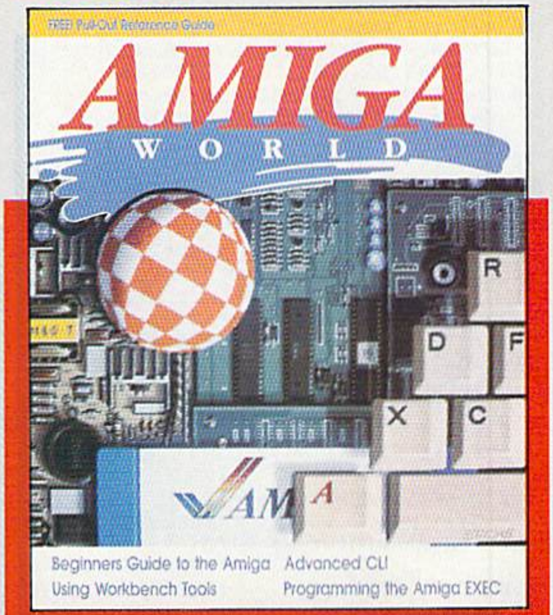
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RN67

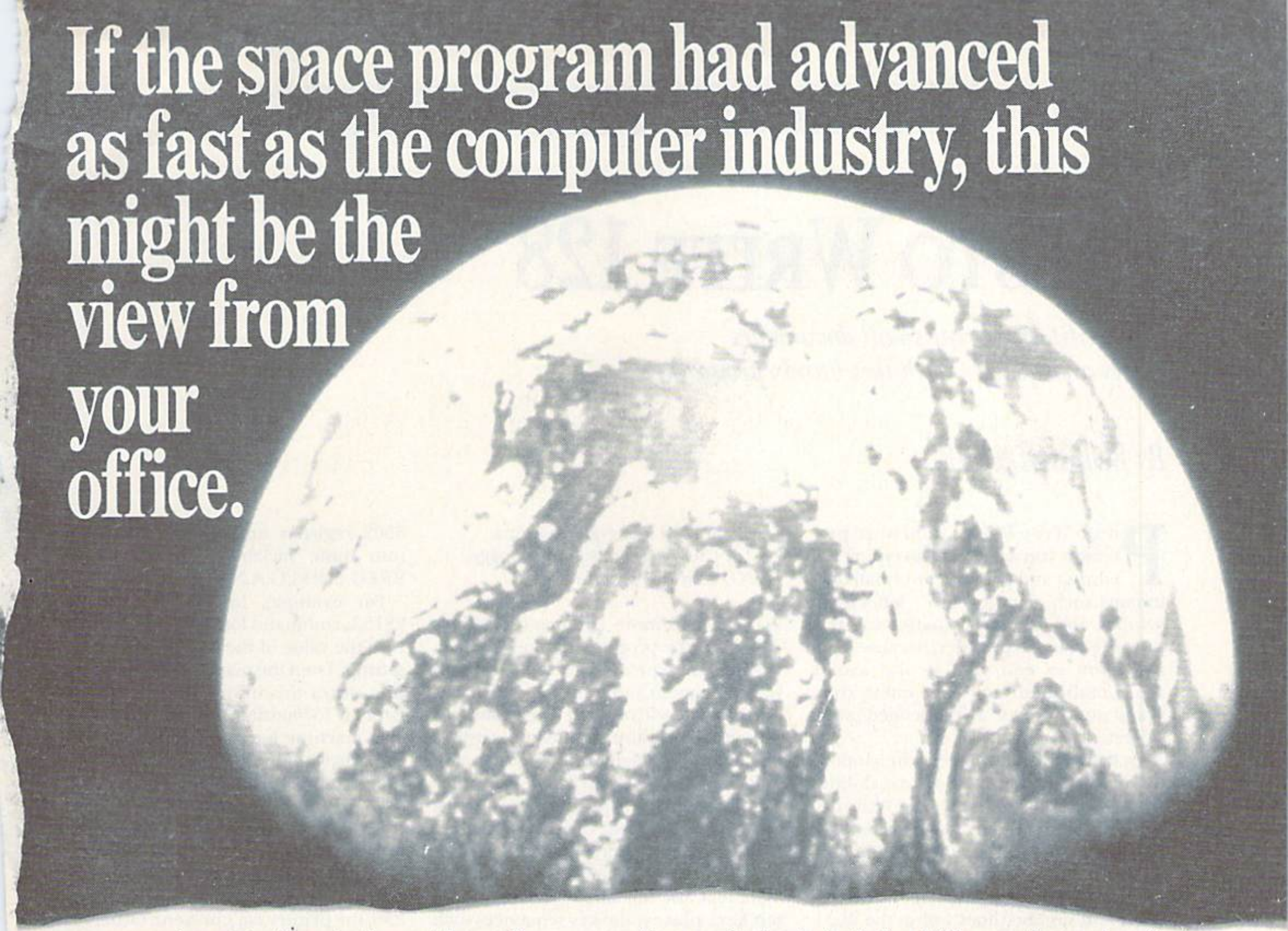
Listing 1. *Robotgraph program.*

30 PRINT
40 GO T
tamar

```
5 REM ROBOTGRAPH 64      :REM*219
10 GOSUB 320:REM SPRITE DATA
                          :REM*88
20 GOSUB 350:REM LINES/SOUND
                         :REM*114
30 FOR CN=0TO7            :REM*14
40 R=23:C=10:GOSUB 470:POKE 781
   ,R:SYS 59903           :REM*32
50 PRINT"{COMD 7}{CTRL 9}HOW MA
   NY IN ";:POKE 646,CN+1:PRINT
   " "CHR$(65+CN);       :REM*188
60 INPUT N$:N(CN)=VAL(N$):IF(N(
   CN)=0 AND N$<>"0")OR N(CN)>1
   0 THEN 40             :REM*230
70 R=21:C=5+CN*4:GOSUB 470
                         :REM*122
80 SC=68+(8*(C-5)):POKE X,SC AN
   D 255:POKE V+16,-(SC>255)
                         :REM*102
90 FOR I=30 TO 202 STEP 2:POKE
   Y,I:GOSUB 430           :REM*8
100 POKE B,BB+(INT(I/6)AND 1):N
    EXT                  :REM*132
110 FOR AR=202 TO 209:POKE B,AR
    :GOSUB 440:FOR T=1TO50:NEXT
    :NEXT                  :REM*6
120 IF N(CN)=0THEN 220 :REM*150
130 PRINT "{CTRL 9}{3 COMD Os}"
                         :REM*192
140 POKE Y,PEEK(Y)-9-4*(N(CN)=.
    5)                    :REM*90
150 FOR RA=0TO(N(CN)-1)*2
                          :REM*76
160 GOSUB 450            :REM*210
170 FOR RB=20TO20+(N(CN)>.5) ST
    EP -1                 :REM*58
180 R=RB-RA:GOSUB 470    :REM*30
190 PRINT "{CTRL 9}";:SYS 13504
                         :REM*136
200 POKE B,210+(PEEK(B)=210):GO
    SUB 440              :REM*136
210 NEXT:NEXT:POKE Y,PEEK(Y)-2:
    GOSUB 450            :REM*202
220 FOR AR=209 TO 202 STEP -1:P
    OKE B,AR:GOSUB 440:FOR T=1T
    O50:NEXT:NEXT          :REM*2
230 FOR I=PEEK(Y)TO30 STEP -1:P
    OKE Y,I:GOSUB 430    :REM*30
240 POKE B,BB+(INT(I/4)AND 1):N
    EXT:NEXT             :REM*196
250 POKE 781,23:SYS 59903
                          :REM*16
260 R=24:C=0:GOSUB 470   :REM*91
270 PRINT"{HOME}PRESS LETTERS A
    -H":POKE198,0:WAIT198,1:GET
    W$:POKE781,24:SYS59903
                         :REM*179
280 IF W$=CHR$(13)THEN PRINT CH
    R$(154):GOTO 20      :REM*75
290 W=ASC(W$)-65:IF W<0 OR W>7
    THEN 270             :REM*121
300 POKE 646,W+1:PRINT CHR$(18)
     W$ " =" N(W);       :REM*209
310 GOTO 260              :REM*89
320 PRINT"PLEASE WAIT ABOUT 6 S
    ECONDS":BB=200:V=53248:X=V:
    Y=V+1:B=2040          :REM*15
330 FOR I=12800TO13520:READD:PO
    KE I,D:NEXT          :REM*255
340 POKE V+21,1:POKE 53276,1:PO
    KE V+37,10:POKE V+38,13:POK
    E V+39,11:RETURN      :REM*23
350 POKE 53281,0:POKE 53280,11:
    PRINT"{SHFT CLR}"     :REM*59
360 FOR I=10TO1 STEP -1:PRINT S
    PC(-NOT I=10)I:PRINT:NEXT
                         :REM*191
370 PRINTCHR$(19):FOR I=1TO20:P
    RINT TAB(4)CHR$(194):NEXT
                         :REM*241
380 PRINT TAB(4)CHR$(173);:FOR
    I=1TO33:PRINT CHR$(195);:NE
    XT                    :REM*15
390 PRINT:PRINT SPC(6)"A";:FOR
    I=0TO6:PRINT SPC(3)CHR$(I+6
    6);:NEXT             :REM*173
400 S=54272:FOR I=STOS+23:POKE
    I,0:NEXT             :REM*139
410 POKE S+24,14:POKE S+4,2:POK
    E S+5,23:POKE S+12,6:POKE S
    +13,6                 :REM*69
420 POKE S+16,6:POKE S+17,6:POK
    E S+15,BB:RETURN      :REM*95
430 IF A<3 THEN A=A+1:RETURN
                         :REM*241
440 A=0:POKE S+1,RND(0)*128+127
    :POKE S+4,33:POKE S+4,32:RE
    TURN                 :REM*139
450 IF RA/2=INT(RA/2) OR (N(CN)
    <1) THEN RETURN       :REM*15
460 POKE S+8,50+RA*9:POKE S+11,
    17:POKE S+18,21:POKE S+18,2
    0:POKE S+11,16:RETURN
                         :REM*199
470 POKE 781,R:POKE 782,C:POKE
    783,0:SYS 65520:RETURN
                         :REM*139
480 DATA 0,0,0,0,0,0,51,255,240
    ,51,191,176,63,191,191,63,2
    55,255,3,127         :REM*159
490 DATA 115,3,213,243,3,255,24
    3,0,63,0,0,63,0,3,255,240,3
    ,247,176,3,255       :REM*209
500 DATA 240,3,239,176,3,255,24
    0,3,255,240,0,170,128,2,170
    ,160,0,0,0,0,0        :REM*97
510 DATA 0,0,0,0,0,0,0,0,3,255,
    243,3,191,179,63,191,191,63
    ,255,255,51          :REM*149
520 DATA 127,112,51,213,240,51,
    255,240,0,63,0,0,63,0,3,255
    ,240,3,127,240       :REM*158
530 DATA 3,255,176,2,255,240,3,
    237,240,3,255,240,0,170,128
    ,2,170,160,0,0        :REM*68
540 DATA 0,0,0,0,0,0,0,0,0,0,0,
    3,255,243,3,191,179,63,191,
    191,63,255,255        :REM*56
550 DATA 51,127,112,51,213,240,
    51,255,240,0,63,0,0,63,0,3,
    255,240,3,247         :REM*34
560 DATA 112,3,191,240,3,247,11
    2,3,191,240,3,255,240,0,170
    ,128,2,170,160       :REM*190
570 DATA 0,0,0,0,0,0,0,0,0,0,0,
    0,0,51,255,240,51,191,176,6
    3,191,191,63         :REM*228
580 DATA 255,255,3,127,115,3,21
    3,243,3,255,243,0,63,0,0,63
    ,0,3,254,240         :REM*152
590 DATA 63,255,240,255,126,240
    ,207,255,240,3,126,240,3,25
    5,240,0,170           :REM*44
600 DATA 128,2,170,160,0,0,0,0,
    0,0,0,0,0,0,0,0,0,3,255,243
    ,3,191,179,63         :REM*22
610 DATA 191,191,63,255,255,51,
    127,112,51,213,240,51,255,2
    40,0,63,0,0,63       :REM*248
620 DATA 0,3,251,240,63,255,240
    ,51,191,176,255,255,240,207
    ,221,240,3,255        :REM*24
630 DATA 240,0,170,128,2,170,16
    0,0,0,0,0,0,0,0,0,0,0,0,0,0
    ,51,255,240,51       :REM*176
640 DATA 191,176,63,191,191,63,
    255,255,3,127,115,3,213,243
    ,3,255,243,0          :REM*62
650 DATA 63,0,0,63,0,3,255,240,
    63,247,176,51,255,240,51,23
    9,176,255,255        :REM*144
660 DATA 240,207,255,240,0,170,
    128,2,170,160,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,3       :REM*238
670 DATA 255,243,3,191,179,63,1
    91,191,63,255,255,51,127,11
    2,51,213,240         :REM*154
680 DATA 51,255,240,0,63,0,0,63
    ,0,3,255,240,63,189,240,51,
    255,240,51,189       :REM*144
690 DATA 240,51,223,240,255,255
    ,240,204,170,128,2,170,160,
    0,0,0,0,0,0,0        :REM*106
700 DATA 0,0,0,0,0,0,51,255,240
    ,51,191,176,63,191,191,63,2
    55,255,3,127         :REM*124
710 DATA 115,3,213,243,3,255,24
    3,0,63,0,0,63,0,3,223,240,6
    3,254,240,51         :REM*224
720 DATA 255,112,51,239,240,51,
    255,240,51,255,240,252,170,
    128,206,170          :REM*140
730 DATA 160,0,0,0,0,0,0,0,0,0,
    0,0,0,0,3,255,243,3,191,179
    ,63,191,191,63        :REM*72
740 DATA 255,255,51,127,112,51,
    213,240,51,255,240,0,63,0,0
    ,63,0,3,255          :REM*120
750 DATA 240,63,126,240,51,255,
    240,51,254,240,51,255,176,5
    1,255,240,48         :REM*114
760 DATA 170,128,254,170,160,20
    4,0,0,0,0,0,0,0,0,0,0,0,0,5
    1,255,240,51         :REM*140
770 DATA 191,176,63,191,191,63,
    255,255,3,127,115,3,213,243
    ,3,255,243,0         :REM*193
780 DATA 63,0,0,63,0,3,255,240,
    63,127,240,51,255,176,51,22
    2,240,51,127         :REM*147
790 DATA 176,51,255,240,48,170,
    128,50,170,160,252,0,0,204,
    0,0,0,0,0,0,0        :REM*189
800 DATA 0,0,3,255,243,3,191,17
    9,63,191,191,63,255,255,51,
    127,112,51,213       :REM*127
810 DATA 240,51,255,240,0,63,0,
    0,63,0,3,255,240,63,247,176
    ,51,255,240,51       :REM*225
820 DATA 239,176,51,255,240,51,
    255,240,48,170,128,50,170,1
    60,252,0,0,204       :REM*181
830 DATA 0,0,0,206,1,208,169,32
    ,162,3,32,210,255,206,1,208
    ,202,208,247         :REM*211
840 DATA 96,0             :REM*25
```

■

If the space program had advanced as fast as the computer industry, this might be the view from your office.



And space stations, Martian colonies, and interstellar probes might already be commonplace. Does that sound utlandish? Then bear these facts in mind:

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PRESTO WRITE 128

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By BOB KODADEK

Presto Write 128 is a mini word processor you can use for typing in, editing and printing out small documents such as notes, short letters, envelopes and labels. It's better for this purpose than a typewriter, because it enables you to edit, and it also avoids the complicated, time-consuming command structure of a full-fledged word processor.

By taking full advantage of the windowing, editing and reverse video capabilities of the 8563 display chip, Presto Write displays on the screen exactly what will be printed on paper. The command line interface (CLI) lets you easily set and alter the margins at any point in your document and number lines within the document for quick position reference.

I wrote part of the program in Basic 7.0 to demonstrate a variety of its commands. However, even this updated version of Commodore Basic is slow for word processing, because it can't build or print long strings of text quickly. So, I also wrote part of the code in machine language. I've found that adding machine language to Basic 7.0 can produce marked increases in speed.

Using Presto Write

Type in Listing 1. As you do so, enter your own data in line 20, which defines the F1 key to automatically print your name, address, city, state and zip code at the current left margin. Then save the program to disk.

The CLI uses the back-arrow character as a command identifier. Any time this character appears in your text, a legal three-character command must follow or an error will be generated.

I've written the following three commands into the program:

—SET Set left and right margins.
—CLR Clear screen, start new page.
—END Exit the program.

You can add more commands in lines 70–110 of the program if you wish.

After you type a —Set command into your document and press the return key, Presto Write will prompt you for margin settings. To choose the default settings of 5 left and 75 right, press return again in answer to each of these prompts. These settings will produce a one-inch margin on either side of your document.

Presto Write's screen editor creates lines of up to 80 characters. To manipulate text, use the cursor, delete and insert keys, plus escape-key sequences such as escape-D, which deletes an entire line. See your *C-128 System Guide* or *C-128 Programmer's Reference Guide* for descriptions of the escape functions available.

You can use the caps-lock and home keys with Presto Write, but never press the home key twice in succession or you'll exit the editing window.

After you enter a line of text and check it for errors, press return to print it out. If you forget to turn on your printer, the program will alert you and let you correct the situation without having to type the line over again.

Passing Parameters

Basic 7.0 really shines in passing parameters (sharing data) between Basic and machine language. With the SYS command, you can place values directly into the accumulator, x, y and status registers before the machine language routine is called from Basic and without using cumbersome Peeks and Pokes. In addition, Basic 7.0 has an undocumented RREG command that reads the 8502 registers and places their values into Basic variables. The format for RREG is RREG A,X,Y,SR.

For example, in line 70, the SYS 2816,L command loads the accumulator with the value of the current left margin setting. Then the machine language routine stores this information to be used later in formatting the printed output. The machine language routine returns to Basic with one of three values held in the accumulator register.

The RREG A command then places this value into the Basic variable A. If A is found to equal 95, a CLI command character was detected during input and the output routine aborts; or, if A equals 255, the printer isn't present. Otherwise, a zero is returned in the accumulator, indicating that no error occurred and no corrective action is necessary. Ⓡ

Listing 1. *Presto Write 128 program.*

```
1 REM PRESTO WRITE 128 :REM*171
2 REM BOB KODADEK        :REM*190
3 REM ASTON, PA          :REM*217
4 REM                     :REM*66
10 L=5:R=75:LN=1:FAST:E$=CHR$(2
   7):GOSUB140:F$=CHR$(15):R$=C
   HR$(13)               :REM*200
20 KEY 1,E$+"D"+"{SHFT B}OB {SH
   FT K}ODADEK"+R$+"3164 {SHFT
   S}URREY {SHFT L}ANE"+R$+"{SH
   FT A}STON,{2 SPACEs}{SHFT P}
   {SHFT A}{2 SPACEs}19014"+R$
                         :REM*140
30 FOR I=0 TO 90:READ D$:POKE 2
   816+I,DEC(D$):NEXT  :REM*104
40 TRAP 220:G=65487:CLOSE4:OPEN
   4,4,7:GOSUB150        :REM*210
50 PRINT"{2 HOMEs}":GOSUB180:BA
   NK 15:COLOR 5,2:WINDOW 0,18,
   79,19,1               :REM*236
60 POKE248,128:WINDOW L,18,R,18
   :S$="":PRINTE$+"A"  :REM*100
```

→

RUN It Right
C-128; printer

Listing 1 continued.

```
70 SYS 2816,L:RREG A:IFA=95 THE
   N BEGIN:C$="":FOR I=0TO3
                        :REM*198
80 C$=C$+CHR$(PEEK(3072+I)):NEX
   T:IF C$="{LEFT ARROW}SET" OR
    C$="{LEFT ARROW}{SHFT S}{SH
   FT E}{SHFT T}" THEN 190
                         :REM*22
90 IF C$="{LEFT ARROW}CLR" OR C
   $="{LEFT ARROW}{SHFT C}{SHFT
    L}{SHFT R}" THEN LN=1:COLOR
    5,13:WINDOW 0,1,79,19,1:GOT
   O40                  :REM*230
100 IF C$="{LEFT ARROW}END" OR
    C$="{LEFT ARROW}{SHFT E}{SH
    FT N}{SHFT D}" THEN PRINT"{
    2 HOMEs}{SHFT CLR}"+E$+"N":
    COLOR 5,4:CLOSE4:END
                        :REM*216
110 PRINT"{2 HOMEs}":CHAR,21,19
    ,"{SHFT N}OT A VALID COMMAN
    D.{2 SPACEs}{SHFT P}RESS {S
    HFT R}{SHFT E}{SHFT T}{SHFT
     U}{SHFT R}{SHFT N} ":SYS G
    :GOTO50:BEND         :REM*86
120 IF A=255 THEN PRINT#4,F$:EL
    SE:LN=LN+1:IF LN>66 THEN LN
    =1:WINDOW 0,1,79,19,1:REM*8
130 WINDOW 0,1,79,18:CHAR,0,17:
    PRINT:GOTO50        :REM*254
140 PRINTCHR$(14)+E$+"R":COLOR
    5,15:PRINT"{SHFT CLR}{3 SPA
    CEs}{SHFT B}ASIC 7.0{18 SPA
    CEs}{SHFT P}RESTO {SHFT W}R
    ITE 128{14 SPACEs}{SHFT B}Y
     {SHFT B}OB {SHFT K}ODADEK{
    6 SPACEs}":COLOR5,13:WINDOW
     0,1,79,19,1        :REM*160
150 PRINT"{2 HOMEs}":COLOR5,16:
    CHAR,0,20,"{SHFT -}0...{SHF
    T -}...1{SHFT -}0...{SHFT -
    }...2{SHFT -}0...{SHFT -}..
    .3{SHFT -}0...{SHFT -}...4{
    SHFT -}0...{SHFT -}...5{SHF
    T -}0...{SHFT -}...6{SHFT -
    }0...{SHFT -}...7{SHFT -}0.
    ..{SHFT -}...8",1:PRINTE$+"
    @"                   :REM*16
160 FORI=0TO79:PRINT"-";:NEXT:C
    OLOR 5,11:CHAR,L,21,"{UP AR
    ROW}":CHAR,R,21,"{UP ARROW}
    "+(R$)              :REM*192
170 CHAR,12,24,"{LEFT ARROW}SET
    =SET MARGINS{6 SPACEs}{LEFT
     ARROW}CLR=CLR SCREEN{6 SPA
    CEs}{LEFT ARROW}END=EXIT{3
    SPACEs}"            :REM*210
180 PUDEF"0":COLOR 5,2:CHAR,35,
    22,"LINE:":PRINT USING"##";
    LN:RETURN           :REM*216
190 L=5:R=75:GOSUB150:COLOR 5,1
    4:CHAR,L,21,(F$)+"{UP ARROW
    }":CHAR,R,21,"{UP ARROW}"+(
    R$)                   :REM*8
200 COLOR5,2:WINDOW 25,22,41,22
    ,1:INPUT" LEFT MARGIN";L:IF
    L>70THEN200         :REM*108
210 INPUT"{SHFT CLR}RIGHT MARGI
    N";R:IF R=<L OR R>79 THEN 2
    10:ELSE 40           :REM*16
220 IF ER=5 THEN COLOR5,11:PRIN
    T"{2 HOMEs}":CHAR,16,22,(F$
    )+(ERR$(ER)),1      :REM*250
230 PRINT CHR$(143)" TURN ON PR
    INTER, PRESS A KEY ":GETKEY
     K$:GOSUB150:RESUME 60
                        :REM*214
240 DATA 8D,5C,0B,A0,00,8C,5B,0
    B,A9,20,99,00,0C,C8,D0,FA
                         :REM*30
250 DATA AC,5C,0B,20,CF,FF,C9,5
    F,D0,05,8D,5B,0B,A0,00,99
                         :REM*80
260 DATA 00,0C,C8,C9,0D,D0,EC,A
    9,00,99,00,0C,85,F4,85,F5
                        :REM*133
270 DATA 85,F6,85,F8,AD,5B,0B,D
    0,1B,A2,04,20,C9,FF,90,07
                         :REM*81
280 DATA A9,FF,8D,5B,0B,D0,0D,A
    0,00,B9,00,0C,F0,06,20,D2
                        :REM*143
290 DATA FF,C8,D0,F5,20,CC,FF,A
    D,5B,0B,60          :REM*117
```

■

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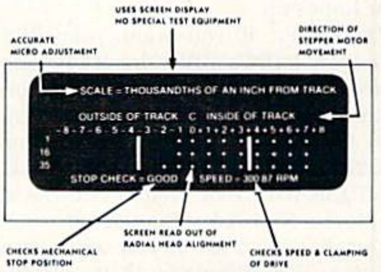
I use a data base to keep records for our club. Last week I experienced read errors. Luckily I have a 1541 Physical Exam program. The alignment test confirmed what I had suspected, my drive was out of alignment. I am happy to report that I aligned my drive MYSELF. I avoided the wait for repair and paid a fraction of the cost.

1541 Physical Exam Sample Screen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1
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35
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By DAVID BRADLEY

This month, I want to start the Workshop with some updates on past columns, plus a couple of other items for you to keep in mind.

First, last February I said you have to be a member of TPUG (Toronto PET Users Group) to order disks from their library of Commodore programs. I've since learned that non-members can order disks for $15 each. Members get them for $10, once they've paid the $25 membership fee. TPUG's address is 5300 Yonge St., Willowdale, Ontario, Canada M5N 5R2.

In December's issue, I mentioned that QuantumLink didn't yet have an access program for the Plus/4. Now I've found out that they never will. I'm sorry if I got your hopes up.

Remember, if you want your BBS listed on *RUN*'s BBS, the RUNning Board, send me all the pertinent information and I'll add it to the growing list.

By the way, you can reach me online as DAVBRADLEY on QuantumLink, DAVIDBRADLEY on Delphi and David Bradley on Node 13 of PunterNet.

Last, but not least, if you send me a question, please include *all* the details you can think of. When I'm trying to solve your telecommunications puzzles, it helps to have as many pieces as possible.

I own a C-64, a 1541 disk drive, an MPS-801 printer and a 1702 monitor. A friend just gave me a 1600 VicModem with QuantumLink software only. Can I get software that will let me access local bulletin boards with my system?

J. Vogel
Woburn, MA

There are lots of terminal programs available for the C-64 and the 1600. Try to find out what transfer protocols (Punter, Xmodem, Kermit, or other) your local BBSs support, then send $5, plus $1 postage, to Public Domain Solutions, PO Box 832, Tallevast, FL 34270. Describe your equipment and the protocols you'll be using, and they'll send you a disk of programs for your modem.

In a couple of recent columns, you mentioned two programs, REL-SEZ CONV.Z and Lynx (versions 6 and above), that convert relative files to sequential files, which is necessary for uploading to CompuServe. Where can I get these programs?

J. Anderson
Tacoma, WA

Both are available from Public Domain Solutions (address above). By the way, I think Lynx is now up to version 9.

I recently purchased a Volks C-6480 modem. It works fine with its own software, but not with public domain terminal programs. Are there any such programs available that will support this modem? Also, can you recommend some games my friends and I can play via modem?

John Etheridge
Corner Brook, Newfoundland, Canada

The Volks C-6480 works differently from other modems, so public domain programs will not ordinarily support it unless they specifically say they do. Public Domain Solutions (address above) has a disk of programs for the C-6480 and a C-64.

There are games available you can play by modem (Operation Terminal is one that's advertised a lot), but before you buy any, make sure they support your C-6480.

Like most computer owners, I'm on a tight budget. I don't have money to spend on a subscription to CompuServe or Q-Link, or on long-distance phone bills. Are there any toll-free bulletin boards, and, if so, could you publish a list of them?

Gil Hearn
Washington, GA

I've been on the lookout for toll-free bulletin boards, but haven't found any yet. Perhaps other *RUN* readers can help. If anyone knows of a BBS you can access without phone charges, please send me the number and system specifications, and I'll include it in the column.

Meanwhile, you'll find a number of BBSs in the 404 area listed in the bulletin board section of the *Computer Shopper*, a monthly publication available at newsstands. If any of those boards are in your local calling area, there won't be phone charges for accessing them.

I have a C-64, a 1541 disk drive and a 1670 modem. I want to use VIP terminal software with this system, but when I try to dial out, the modem dials, then plays a short tune and hangs up. What could be causing this problem, and how can I fix it?

Paul Kempik II
Elgin, IL

The cause may be the printer or a defective chip in your computer. I've had a problem of this kind and have found that if I disconnect my printer, everything works fine. Another fellow I know has had a similar difficulty, but he tracked the cause to one of the 6526 chips in his C-64. If you can, try your modem and terminal program on another computer to see if that makes any difference.

Donald Flesch, of Salem, Oregon, has had a related problem. He owns a C-128, a Star SL-10C printer, a 1541 disk drive and a 1571 disk drive. When he moved from a 1660 modem to a 1670, the 1670 wouldn't dial out. It would work on another system, so he knew the fault wasn't with the modem.

He went home and disconnected everything but one disk drive. The modem worked! After he reconnected the other drive, the modem still worked. However, after he put the printer back online, the modem wouldn't dial out again.

I'd like to get a modem, but my dad has heard about the phone bills involved. Is there any way to keep the phone bills minimal?

Tim Dugan
Middletown, PA

Users of national online services like CompuServe, the Source and GEnie certainly are familiar with large bills. However, the bills usually aren't from the phone company, because in many places these systems can be accessed locally via Tymnet or Telenet. The bills are from the systems themselves.

Calling bulletin boards long distance can also be expensive, and the phone bills are the culprit this time. The charges are the same as for voice calls.

Before you get your modem, see if there are any free or low-cost bulletin boards in your local calling area. The *Computer Shopper* I mentioned above lists several with 717 area codes; some of them may be local calls for you.

In my business, we transfer files between our Commodores—an SX-64 and two C-64s—and a Tandy 600. The Commodore systems include a disk drive, a printer, a Volks C-6420 modem and AutoCom IV software to go with the modem. So far, we've been transferring the files through the serial port of the Tandy, but this limits the speed to 300 baud.

The Tandy has an RS-232 port also, and we have a Null modem cable available to plug into it. If I were to buy an RS-232 interface to install between the Commodores and the Null modem, could we transfer files at higher speeds—perhaps even 2400 baud?

We'd also need software for the Commodores. Is there a program available that would suit the purpose? The Tandy has built-in software that supports up to 9600 baud.

Is this project feasible, or are we out in left field?

Raymond J. Clare
Indianapolis, IN

No, you're not out in left field. An RS-232 interface that would work is the Omnitronix Deluxe, available for $49.95, plus $2 shipping and handling, from Omnitronix, Inc., 760 Harrison St., Seattle, WA 98109. A good software choice would be ThirdTerm, which you can get from Public Domain Solutions (address above) for $5 plus $1 postage. With these products added to your system, you should certainly be able to transfer data at 1200 baud, and possibly at 2400 baud as well. Time is money, and it won't take long for the additional hardware and software to pay for themselves.

I have a Westridge modem that I purchased for my old C-64. The software that came with the modem downloads programs as sequential files filled with hex numbers. Now I've bought a C-128 and want to download programs for the 128 and CP/M modes as well. What software can I get that will do the trick?

Harvey Hackett
Glenview, IL

I don't know of a program that will do everything you want. However, if you send $3 to Public Domain Solutions (address above) for their catalog, I'm sure you'll find one or more programs that will meet your needs.

Telecomputing Workshop Survey

Would you take a few minutes to help me make Telecomputing Workshop the most informative column possible? I need to know what equipment, software and online services work well for you. With a store of this information from many readers, I'll be able to answer your questions more accurately and thoroughly.

Please send a list of the computer(s), disk drive(s), modem(s), printer(s) and other equipment you use, plus the telecommunications software that runs with it. Also include the names of your favorite BBSs and their features, hours, operating speeds and what you like about them. If you use any of the national online networks like QuantumLink, Delphi or People Link (P-Link), list those and what you like about them, too.

Send your response to me at the address below. Thank you.■

Telecomputing Workshop is a monthly column dedicated to the needs of RUN *readers who are using, or intend to use, a Commodore computer for telecommunications. We invite you to submit your questions or comments to:*

David Bradley
Telecomputing Workshop
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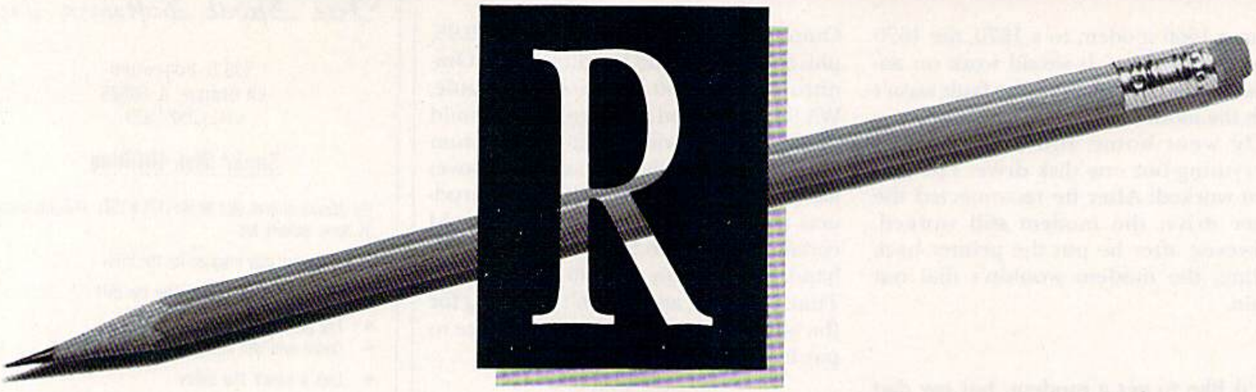

By MARGARET MORABITO

If you're a teacher, a gradebook program can save you time and aggravation.

Teachers have a demanding work day. Not only do they teach, but they counsel students, prepare budgets, coach athletic teams, and even patrol cafeteria and recess areas. And after the last bell rings, they don't just go home and take it easy. They have to prepare lessons, homework assignments and tests, correct and mark students' work, calculate grade averages and talk to parents.

Of all these jobs, perhaps the most time-consuming is figuring semester and final grade averages. Until recently, grade averaging was done with pencil and paper, then a hand calculator. Now teachers are discovering that a personal computer and a gradebook program can speed up this process and let them manipulate their data in more productive ways. Not only can they figure grade averages, but also generate various types of reports for use throughout the school year. Electronic gradebooks are flexible and powerful enough to accommodate all teaching levels, too, from elementary through college.

A basic feature of all gradebook programs is the class roster. Most programs can handle many classes, with varying numbers of students, allow you to add or delete students and create a duplicate roster if you have the same group of students for different subjects.

The fundamental purpose of a gradebook is to calculate individual averages, but various programs do this in different ways. With some, you input grades as points earned out of a possible total. The program keeps a running count and, at the end of the semester, generates a sum and converts it into a letter grade. With others, you input letter grades and assign numeric values to the letters. There are even more flexible programs that accept both letter and number input.

While calculating individual averages is the main goal of gradebook programs, some go further. They'll figure class averages on particular assignments; perform statistical analyses such as standard deviation, mean and median; and print out graphs of class performance, as well as reports and forms.

The report-printing function alone makes gradebooks invaluable. With a well-designed program, you can create all the documents you'll need throughout the year, including class lists with semester grade averages; attendance sheets; individual student progress reports with missing assignments and teacher evaluations; class performance reports on particular assignments; and parent communications. With some gradebooks, you can design your own reports.

Most schools still require the traditional hard-copy grading book as a permanent record, so electronic gradebooks let you create and print out appropriate forms. You can tailor these to include the student's name and identification number, assignment type, due dates, grades and averages—whatever you need.

Electronic gradebooks incorporate features found in spreadsheets and databases. For example, they'll let you search for individual records and class averages so you can assess an individual student's performance or spot class trends. You can also sort class rosters into alphabetical or numerical order and students' grades into descending order according to exam type or marking period.

A crucial feature of a gradebook is the ability to handle many categories of assignments, but allow you to exclude irrelevant ones when you're calculating averages. It should also be able to assign different weights to tests and papers, according to their importance.

The best electronic gradebooks have anticipated these varying needs and provide an encompassing framework in which you can work. Of course, it'll take you time to learn how to use all the functions of these programs, but for years to come you'll save time and be more productive.

Here's a brief look at three commercially available electronic gradebooks for the C-64 and C-128. They offer features typical of gradebook programs on the market today, and they illustrate the level of professionalism that software developers are attaining. A list of manufacturers and prices appears in Table 1.

Grade Manager

Grade Manager by ACS runs on the C-64. It includes eight assignment categories you can customize to your class, and it lets you assign weights to the categories.

During setup, you input the total possible points for each assignment. Then, when you actually input student grades, you type the number of points achieved, not the percentage or the letter grade. The program calculates the percentage grade based on this data.

Grade Manager lets you create, view, modify and print out class rosters; grades for individual students, the entire class or specific assignment categories; and a variety of reports. It also provides a screen dump, and the manual includes a tutorial.

McGuffy's Grader

A fairly new release, McGuffy's Grader for the C-64 and C-128 in 128 mode was produced by Midwest Software in response to teacher demand for a more comprehensive gradebook program than its Master Grades package. McGuffy's Grader comes with a manual, plus demos on disk for fast mastery of the program.

I tested the C-128 version, which operates in 80-Column mode and offers windows for combining data on the screen. The program is constructed around a 3000-entry spreadsheet that's designed for inputting, manipulating, sorting and printing out student information.

Twenty assignment categories are built into the program. It can also handle up to four marking periods at once, and store data on up to nine classes on one disk. Grades can be input as letters or numbers, and when you're typing in assignment scores, you can include a description of the assignment in an onscreen information window. The same kind of window is used for inputting student names.

McGuffy's Grader offers a lot of control over the setup of your gradebook and produces a variety of printed lists and reports, including a complete progress report for each student, with comments. If you want to design your own report, you can do that, as well as print out gradebook pages and perform statistical analyses.

The documentation with McGuffy's Grader is clear and comprehensive, and it even provides advice on grading methods. This is a professional gradebook management system that should meet all your needs.

Grade Manager III

Smoky Mountain's Grade Manager III is another quality program that, like the ACS Grade Manager, runs on the C-64. It accepts input from the numeric keypad. The package includes two program disks, a manual, a reference card and membership in the Grade Manager III user's group, which sends out a newsletter.

This program can handle up to 95 assignments and grades per term and then calculate averages for up to six terms, including midterm and final grades. It can also handle an unlimited number of classes, each one with up to 100 students, and sort data on those students. You can weight assignments as certain percentages of the total grade, and you can weight each term average.

Grades are input as percentages, or you can type in the number of wrong answers out of the total number of questions, and the program will calculate the percentages. The grade display is either in percents or letters, and it's possible to modify the numeric equivalents of letter grades.

Grade Manager III displays some reports on the screen and prints out a lot more in hard copy, including complete gradebook reports and a report card summary covering up to 600 students. You can also print out progress reports on individual students in the form of a letter to the student, with room for comments.

Grade Manager III is available in the third release of Smoky Mountain Software's Gradebook Manager. It's been updated according to teacher requests, and the improvement is evident.

Does It Pass the Test?

As with any major software purchase, before you buy an electronic gradebook, take time to analyze your needs. Then try to see in action any program you're considering.

Also, contact the manufacturer for the names of teachers in your area who use the program. Ask the teachers how they like it and if they'll send you sample printouts.

Your electronic gradebook can be very important in your life. Be sure it's the one you need!■

Table 1. *Manufacturers' addresses and prices.*

Grade Manager/C-64
Associated Computer Services
1306 E. Sunshine
Springfield, MO 65804
$69.95

McGuffy's Grader/C-64 and C-128
Midwest Software
PO Box 214
Farmington, MI 48024
$49.50

Grade Manager III/C-64
Smoky Mountain Software
PO Box 1710
Brevard, NC 28712
$69.95

If you're using Commodore computers for educational purposes (at home or in school) and would like to share your experiences through The Resource Center, write me a letter detailing the equipment you're using, subject areas you teach, grade level or age of your students, software you're using and any other information you feel like including.

Also, if you'd like to donate public domain educational programs to The Resource Center for sharing with other educators or parents, please send along a disk with a brief description of the program. Send correspondence and disks to:

Margaret Morabito
The Resource Center
c/o RUN Magazine
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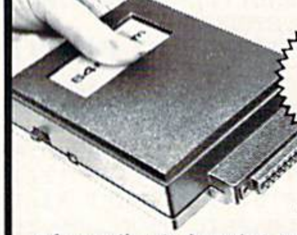

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City ______________________
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Phone (   ) ______________________
Sign Here ______________________

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Magic *From p. 12.*

$3F0 Kaleidoscope

$3F0 Kaleidoscope—Turn your C-128's 40-column screen into an electronic kaleidoscope. The program will run until you press any key.

```
0 REM KALEIDOSCOPE - ROBERT BIXBY
10 GRAPHIC3,1:SCALE1,640,200:COLOR0,1
20 A=INT(RND(TI)*320):B=INT(RND(TI)*200):C
   =INT(RND(TI)*320):D=INT(RND(TI)*200):DR
   AW1,A,BTOC,D
30 FORI=1TO3:COLORI,RND(TI)*16+1:DRAWI,A,B
   TOC,D
40 DRAWI,319-A,199-BTO319-C,199-D
50 DRAWI,319-A,BTO319-C,D
60 DRAWI,A,199-BTOC,199-D:A=C:B=D:C=INT(RN
   D(TI)*320):D=INT(RND(TI)*200):COLORI,RN
   D(TI)*16+1:NEXT:GET A$:IF A$="" GOTO30:
   ELSE GRAPHIC 0:COLOR5,2:END
```

Robert Bixby
Kalamazoo, MI

$3F1 Magic number-guesser

$3F1 Magic number-guesser—Amuse and mystify your friends with my magic number-guesser program. Just follow the prompts on the screen.

```
10 REM MAGIC NUMBER-NEVIN FAHS
20 PRINT"{SHFT CLR}{2 CRSR DNs}FOR FURTHER
   INSTRUCTIONS PRESS ANY KEY"
30 PRINT"WRITE DOWN ANY 5 DIGIT RANDOM NUM
   BER":GOSUB110
40 PRINT"NOW RE-ARRANGE THE DIGITS IN ANY
   ORDER{2 SPACEs}";
50 PRINT "AND SUBTRACT SMALLER FROM LARGER
   .":GOSUB110
60 PRINT"CROSS OUT ANY DIGIT (EXCEPT ZERO)
   AND{3 SPACEs}TYPE IN THE REMAINING NUM
   BER"
70 INPUT A$
80 FORT=1TO4:X=X+VAL(MID$(A$,T,1)):NEXT
90 X=X-INT(X/9)*9
100 Y=9-X:PRINT"{SHFT CLR}THE NUMBER YOU C
   ROSSED OUT WAS"Y:END
110 GET S$:IFS$=""THEN110
120 PRINT:RETURN
```

Nevin Fahs
Honolulu, HI

$3F2 Fastload directory pause

**$3F2 Fastload directory pause**—Directories longer than 25 lines are difficult to view with the Fastload cartridge, since there's no provision for pausing the screen. To pause the directory listing, load the directory as a Basic file with the command /$ and list it. Slow down the scrolling listing with the Commodore key and pause it with the stop key. Of course, this method will overwrite any program in memory when the directory is loaded.

Rudy McDaniel
APO New York, NY

$3F3 Guitar-tuning aid

$3F3 Guitar-tuning aid—This C-64 program produces reference tones by which to adjust the string tensions on your guitar. Each reference tone continues to sound until you press the space bar for the next tone.

```
10 PRINT"{SHFT CLR}C-64 GUITAR TUNING AID
   - J.R.CHARNETSKI"
20 FORI=1TO6:READL(I),H(I):NEXT
30 R=54272:FORI=RTOR+23:POKEI,0:NEXT
40 POKER+5,102:POKER+6,102:POKER+24,15
50 PRINT"{2 CRSR DNs}PRESS{CRSR DN}"
60 PRINT"ANY KEY TO TURN SOUND ON OR OFF"
70 PRINT"SPACE BAR FOR NEXT STRING SOUND"
80 PRINT"ANY FUNCTION KEY TO END PROGRAM"
90 GET A$:IF A$=""THEN90
100 POKER+4,0
110 IFA$=CHR$(32)THENI=I+1:GOTO140
120 IFA$>CHR$(132) AND A$<CHR$(141)THENPOK
   ER+24,0:END
130 IF X THEN X=0:GOTO90
140 IFI>6THENI=1
150 POKER,L(I):POKER+1,H(I)
160 POKER+4,33:X=I:GOTO90
170 DATA 71,5,12,7,104,9,142,12,210,15,30,
   21
```

Joseph R. Charnetski
Dallas, PA

$3F4 Envelope addresser

$3F4 Envelope addresser—Here's a program to address business-size envelopes. I use it each month when paying bills and sending letters to friends. Once you save the program, load and list it, change the lines to the address you need and save it under a new name. When you run the program, it will print your return address first and then the recipient's address.

```
0 REM ENVELOPE ADDRESSER-JUDY ROBERTS
10 OPEN1,4:CMD1,"";
20 PRINT"{SHFT Y}OUR ADDRESS HERE"
30 PRINT"{SHFT Y}OUR STREET"
40 PRINT"{SHFT C}ITY, {SHFT S}TATE ZIP"
50 FORX=1TO8:PRINT:NEXT
60 PRINTSPC(30)"{SHFT A}DDRESSEE'S NAME"
70 PRINTSPC(30)"{SHFT A}DDRESSEE'S STREET"
80 PRINTSPC(30)"{SHFT A}DDRESSEE'S CITY, S
   TATE, ZIP"
90 PRINT#1:CLOSE1
```

Judy Roberts
Phelps, KY

$3F5 Here comes the bride

$3F5 Here comes the bride—This program is dedicated to all you romantic people out there. After the program ends, press any key to exit Graphic mode.

```
10 REM WEDDING RING -JASON HANRAHAN
20 GRAPHIC 1,1,24:COLOR0,1:COLOR4,1:COLOR1
   ,8
30 FOR X=196 TO 208:CIRCLE 1,X,125,35,57:
   NEXT
40 DRAW 1,200,68 TO 208,68 TO 200,58 TO 19
   6,68 TO 200,68
50 DRAW 1,208,68 TO 216,48 TO 200,58
60 DRAW 1,208,68 TO 224,45 TO 216,48
70 DRAW 1,196,68 TO 188,48 TO 204,58
80 DRAW 1,196,68 TO 176,45 TO 188,48
90 DRAW 1,176,45 TO 192,40 TO 188,48 TO 21
   6,48
100 DRAW 1,192,40 TO 202,48 TO 212,40 TO21
   6,48
110 DRAW 1,192,40 TO 212,40
120 DRAW 1,212,40 TO 224,45
130 GETKEY A$:GRAPHIC0
```

Jason Hanrahan
Whitetail, MT ■

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The Shape of Sprites to Come—This month's program cycles through the creation and deletion of four sprites stored in an array.

When you type in the program, enter line 70 only if you're using a C-128 in 128 mode. This line places the sprite in the proper location on the C-128's screen. When you run the program, the first sprite that appears replaces its bytes until it assumes another shape. Delete lines 80 and 90 to see the order in which the bytes are replaced.

A random number is swapped with the *X*th element in the array, to shuffle the order in which the image changes, with only one pass through the array.

The Pokes in line 100 determine the screen location of the sprite (for the C-64) and expand the sprite in two directions. Expanding makes it easier to see the sprite as its bytes are replaced. Line 110 sets the sprite block to the proper location, turns the sprite on and sets the sprite's color to white.

The value of Y cycles through the sprite images in line 120. The For-Next loop takes the *X*th number from the order array, adds it to the sprite memory pointer and pokes that location with the appropriate byte from sprite image Y. Sprite image Y is then incremented and the range checked. Have fun experimenting with different values in all of these locations. 🅁

Jim Borden
Carlisle, PA

Listing 1.

```
10 PRINT"{SHFT CLR}{CTRL 2} **** HI-TECH S
   PRITES - JIM BORDEN ****"         :REM*246
20 POKE53280,0:POKE53281,0:X=RND(-TI)
                                      :REM*12
30 DIM S%(4,63):V=53248:SP=832       :REM*240
40 FORX=0TO63:S%(0,X)=X:NEXT          :REM*52
50 FORY=1TO4:FORX=0TO63:READS:T=T+S:S%(Y,X
   )=S:NEXT:NEXT                     :REM*230
60 IFT<>18932THENPRINT"ERROR IN SPRITES":E
   ND                                :REM*210
70 IFFRE(0)>40000THEN MOVSPR1,136,120:SP=3
   584                                :REM*82
80 FORX=0TO63:Y=RND(1)*64:Z=S%(0,X):S%(0,X
   )=S%(0,Y)                           :REM*8
90 S%(0,Y)=Z:POKESP+X,0:NEXT:Y=1:REM SCRAM
   BLE ARRAY,0                       :REM*114
100 POKEV,136:POKEV+1,120:POKEV+29,1:POKEV
    +23,1:REM LOC(64)+EXPAND          :REM*94
110 POKE2040,SP/64:POKEV+21,1:POKEV+39,1
                                      :REM*16
```

→

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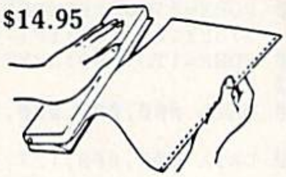

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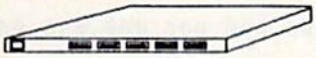

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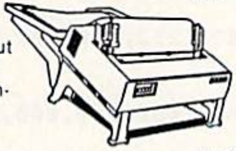

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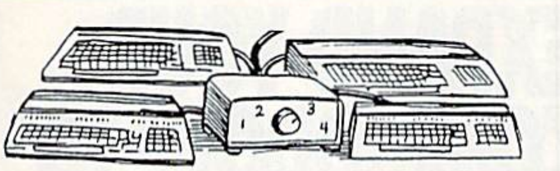

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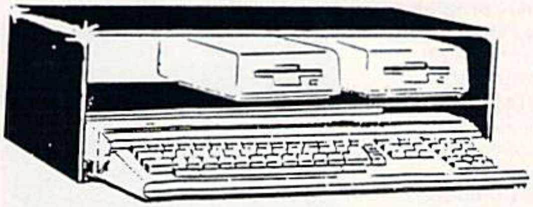

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Listing 1 continued.

```
120 FORX=0TO63:POKESP+S%(0,X),S%(Y,S%(0,X)
    ):NEXT:Y=Y+1:IFY>4THENY=1            :REM*206
130 FORX=1TO1500:NEXT:GOTO120            :REM*130
140 :                                    :REM*116
150 DATA 000,008,000,000,028,000,000,062
                                         :REM*240
160 DATA 000,000,127,000,000,239,128,000
                                           :REM*8
170 DATA 123,000,000,255,128,001,222,192
                                         :REM*140
180 DATA 003,255,224,001,251,192,003,191
                                         :REM*240
190 DATA 224,007,239,240,015,125,248,029
                                         :REM*164
200 DATA 255,188,063,255,254,000,028,000
                                          :REM*82
210 DATA 000,028,000,000,028,000,000,028
                                          :REM*54
220 DATA 000,000,028,000,000,000,000,000
                                          :REM*28
230 :                                    :REM*206
240 DATA 000,000,000,000,056,000,000,124
                                         :REM*168
250 DATA 000,000,214,000,000,254,000,024
                                         :REM*210
260 DATA 068,048,012,124,096,006,056,192
                                         :REM*109
270 DATA 003,255,128,003,255,000,007,239
                                         :REM*199
280 DATA 128,015,255,192,015,255,192,015
                                         :REM*161
290 DATA 239,192,015,255,192,007,255,128
                                         :REM*107
300 DATA 003,255,000,001,254,000,255,255
                                         :REM*177
310 DATA 252,000,000,000,000,000,000,000
                                         :REM*245
320 :                                     :REM*41
330 DATA 000,000,000,000,063,254,000,065
                                          :REM*73
340 DATA 006,000,130,010,001,255,242,002
                                          :REM*51
350 DATA 008,050,004,016,086,015,255,154
                                         :REM*237
360 DATA 008,032,146,008,032,178,008,032
                                         :REM*187
370 DATA 212,015,255,152,008,032,144,008
                                         :REM*105
380 DATA 032,160,008,032,192,015,255,128
                                          :REM*17
390 DATA 000,000,000,000,000,000,000,000
                                         :REM*165
400 DATA 000,000,000,000,000,000,000,000
                                         :REM*175
410 :                                    :REM*131
420 DATA 000,000,000,000,034,034,000,020
                                         :REM*129
430 DATA 020,000,008,008,000,007,240,000
                                          :REM*93
440 DATA 015,248,000,015,172,000,015,254
                                          :REM*33
450 DATA 000,007,255,000,007,254,000,015
                                         :REM*235
460 DATA 128,128,031,000,127,254,000,063
                                          :REM*27
470 DATA 254,000,127,254,000,252,059,000
                                         :REM*107
480 DATA 216,027,000,216,027,000,216,027
                                         :REM*239
490 DATA 000,216,027,000,216,027,000,000
                                           :REM*9
```

■

Circle 72 on Reader Service card.

COMMODORE CLINIC

By JIM STRASMA

SOFTWARE

Q: My Okidata 120 bidirectional printer is Commodore-compatible (no additional interface needed), but it prints out documents from GEOS, Newsroom and The Print Shop in one direction only, because those programs are intended for the unidirectional MPS-801. The process is painfully slow. Is there a bidirectional driver available that I can use with these programs?

Dustin Cox
Haddonfield, NJ

A: I haven't heard of one, but if there were, you might be disappointed with its performance. The three programs you mention use bit-mapped graphics to draw characters, rather than the standard character sets built into the printer. This enables the programs to use different fonts and sizes for characters, and to combine characters with pictures and designs.

It's a powerful feature, but prone to slight variations in dot positioning caused by the bidirectional printing. That is, a dot may end up in a slightly different position on the paper if it's printed while the print head is moving from left to right than if the print head is moving from right to left. A distinct waviness of vertical lines usually results from bidirectional printing of graphics designs. To avoid this, many manufacturers of graphics programs have chosen unidirectional printing.

If you still want bidirectional printing, start your printouts with a short printer set-up command string in any program supporting bidirectional printers. On the printer I use, I can begin bidirectional printing with escape/U and 1, or with the following string:

```
CHR$(27);CHR$(85);CHR$(48)
```

I expect you'll find a similar command in your Okidata 120 manual.

If you can't find a way to send the needed command from within your programs, try sending it just before loading them, as follows:

```
OPEN 4,4;PRINT#4,CHR$(27);CHR$(85);
  CHR$(48);:CLOSE 4
```

Q: I use Timeworks' Word Writer program to write letters to constituents in my city council district. However, when I address the envelope, I must rely on my penmanship, which isn't too legible. I'm told there's no way of addressing a single envelope with Word Writer. Perhaps one of your readers could devise a way.

Al Colvin
Bremerton, WA

A: While we wait for suggestions from readers, you could try a technique I use myself. Begin each letter by loading the template of a form letter from disk. Then fill in the recipient's address, write the letter and print it out. Next, save your letter to disk and erase everything in the letter except the recipient's address.

Since the address is at the left side of the page, either insert a few tabs at the start of each address line to center it on the page, or change the left margin. Finally, print the remainder of your letter—namely, the recipient's address.

[Editor's note: See this issue's Magic trick $3F4, Envelope Addresser, a program that prints the return address and the recipient's address on a business envelope.]

Q: My copy of the F-15 flight simulator from MicroProse fails to load on my C-64. Instead, the program tells me I have "Hardware Failure." It does load properly on a friend's C-128, on a borrowed 1541 and on my 1541 with a repair shop's C-64. What do you think is the problem?

John Graham
Miami, FL

A: A surprising number of software companies are unaware that there are several versions of the C-64 Kernal ROM in use, since Commodore doesn't publicize such information. My first guess is that your C-64 has an early Kernal ROM, and that incompatibility keeps your program from loading. If you update the chip, the problem should go away.

However, before you buy a new chip, try loading your flight simulator after disconnecting any unnecessary accessories from your system. I had a similar problem with Gunship, a MicroProse program that has captured my son's attention lately. When I unplugged my RS-232 interface, the program loaded.

HARDWARE

Q: I recently bought a Commodore 1350 mouse, and, after looking through the pamphlet that came with it, I realized that true 360-degree, variable-speed mouse control is impossible with the pins it uses. The pins control only one button and four directions, simulating a joystick. Did I waste my money?

Remy Fox
Toronto, Ontario, Canada

A: Since I don't like working with a mouse, I'm inclined to answer yes. On the other hand, given the limitations of the joystick port to which the Commodore mouse is connected, how much more can you expect?

A PC- or Macintosh-quality mouse would have to connect to the computer via the RS-232 port. That would add significantly to the cost of the mouse, and cost is something Commodore tries to keep to a minimum. It would also make the mouse incompatible with a lot of Commodore programs that support the joystick port.

Q: What are the differences between the C-128 and the B-128 computers?

Jeremiah Brooks
Franconia, NH

A: The B-128 was the last of the Commodore CBM models sold in the U.S. It included many of the features later incorporated into the C-128, such as an expanded version of Basic, expanded memory and an improved keyboard. However, it was a monochrome machine and largely incompatible with the C-64, even though the two machines could share simple Basic programs.

The B-128's primary disk drive, the 8050, was well made and possessed a much larger capacity than a 1541 or even a 1571. However, it used a format incompatible with the C-64, which prevented disk swapping with C-64 owners. Similarly, the B-128's printer, the 8023, used graphics commands different from the 1525's and 801's, so it was incompatible with graphics printing programs for the C-64.

The B-128 was also, in some respects, an unfinished machine, since the CP/M and MS-DOS options originally planned for it never materialized, at least not in the U.S. When the B-128 was discontinued, Commodore sold them at attractive closeout prices, primarily through a U.S. dealer.

The key difference between a B-128 and a C-128 now is that there probably won't be many new programs for the B-128. Thus, it's a good purchase only if the price is right and all needed programs are included.

Q: We're considering replacing our C-64, two 1541 disk drives and a 1702 monitor with a C-128, two 1571 drives and a 1902A monitor. We use our computer system for business, so it must be reliable. Are the 128 and 1571 reliable? Except for replacing a voltage regulator, one fuse (our fault) and aligning the disk drives, we haven't had to service our C-64 in over three years.

Gary Sherman
Ceresco, NE

A: If reliability is your primary concern, you already have it. If you want additional reliability, then perhaps instead of replacing your current system, you should supplement it.

You already have two disk drives. If you had a spare computer and monitor or TV, you'd be assured of continued operation after any single failure. Naturally, buying a C-128 and 1902A is one good way to get that second computer and monitor.

PROGRAMMING

Q: I write programs and often include music in them. I start the songs with a SYS 30120 command. Can I replay a song without having to press a key?

Jason Massey
Shreveport, LA

A: Yes, you should be able to. If your program won't let you add new line numbers, you can command multiple plays in Immediate mode by adding a For-Next loop to the SYS command itself. For example,

```
FOR I = 1 TO 9:SYS 30120:NEXT
```

will play the song nine times before quitting, and replacing the 9 with 1E6 will repeat the song a million times. (1E6 is scientific notation for 1 times 10 to the 6th power—one million.)

If you can add line numbers to your programs, a more elegant solution would be to have an Input statement ask how many times the song should repeat, as in:

```
10 INPUT"HOW MANY REPETITIONS";R
20 FOR I = 1 TO R
30 : SYS 30120
40 NEXT I
50 END
```

Q: Last year my C-64 assisted me in sending personalized mailings, the names and addresses for which came from a publisher's file. I want to do another mailing this year, but the new list is a mixture of old and new records.

My computer needs a way to compare last year's list to this year's, and then delete the duplicates.

Robert Menthen
New York, NY

A: Assuming the publisher presorted the lists in the same order both years, all you need for culling out duplicates is a simple merge program. Assuming each address is readable from a sequential disk file with a single Input statement, the program would look something like this:

```
100 OPEN 15,8,15
110 OPEN 1,8,3,"0:OLDLIST,S,R"
120 GOSUB 380
130 OPEN 2,8,4,"0:NEWLIST,S,R"
140 GOSUB 380
150 OPEN 3,8,5,"0:MERGEDLIST,S,W"
160 GOSUB 380
170 INPUT#1,A$
180 GOSUB 380
190 IF EN = 64 THEN A$ = "ZZ"
200 INPUT#2,B$
210 GOSUB 380
220 IF EN = 64 THEN B$ = "ZZ"
230 IF A$ < B$ THEN 320
240 IF A$ > B$ THEN 290
250 IF A$ = "ZZ" THEN 410
260 PRINT#3,A$
270 GOSUB 380
280 GOTO 170
290 PRINT#3,B$
300 GOSUB 380
310 GOTO 200
320 PRINT#3,A$
330 GOSUB 380
340 INPUT#1,A$
350 GOSUB 380
360 IF EN = 64 THEN A$ = "ZZ"
370 GOTO 220
380 INPUT#15,EN,EM$,ET,ES
390 IF EN < 2 OR EN = 64 THEN
    RETURN
400 PRINT EN,EM$,ET,ES
410 CLOSE 1,2,3
420 END
```

This program compares two records, and the one with the lower ASCII value is written to a new combined file. Then another record is read from the input file that the lower-ASCII record just came from, and the process repeats.

When there is a duplicate, only one record is added to the new file, but another record is read from both input files.

When either file ends, its comparison variable is changed to two capital Zs, to ensure that the other record is written instead. When both input files end, so does the program.

Q: Every time I try using Poke commands in a program on my VIC-20, the screen prints garbage and locks up. Is this problem common on VIC-20s?

Curt D'Onofrio
Shelton, CT

A: It's a bit more common on VIC-20s than on C-64s, primarily because important Poke locations can move around so much within the VIC, depending on the amount of memory installed. Most of the published Pokes for VICs are based on the machine's bare 3.5K memory. If you have added memory, try unplugging it and see if the Pokes work.

On all VICs and C-64s, it's important to type in Pokes correctly and to save a copy of any program containing Pokes before running it. Poke statements, unlike most other statements in Basic, are quite capable of crashing the system entirely, requiring you to turn your machine off and on again.

Q: *Would you please provide an assembly language version of the following Basic program?*

```
10 FOR I = 1 TO 255
20 Z$ = Z$ + CHR$(0)
30 NEXT I
```

Todo Brye
Liverpool, NY

A: Assuming Z$ is the first variable defined in your program and it's already been defined to a length of 255, the following C-64 assembly language source and object code will do what you want:

```
Object     Source
Code:      Code:

A9 00      LDA #0
A8         TAY
91 2D      STA ($2D),Y
C8         INY
D0 FB      BNE LOOP
60         RTS
```

Both forms are relocatable, so store them wherever you like and call them with a SYS command to their first address. To use them on other Commodore computers, replace the $2D byte with the address of an equivalent two-byte Start of Variables pointer in memory page 0.

Q: *How can I write a program so a comma in a response to an Input statement won't generate an Extra Ignored message?*

Howard Angione
Jamaica, NY

A: One solution is to begin all Input statement responses that contain commas with a quotation mark. Thus, if an Input statement asked for my name, last name first, I could reply "STRASMA, JIM, and the comma would be accepted as part of the answer.

A better solution, to use in programs you write yourself, is to replace the Input statement with a Get loop. Thus, instead of:

```
10 INPUT"NAME (LAST, FIRST)";N$
```

you could write:

```
10 PRINT"NAME (LAST, FIRST)";
20 GOSUB 200
```

where lines 200 and beyond contain a Get routine such as:

```
200 N$ = ""
210 GET A$
220 IF A$ = CHR$(13) THEN RETURN
230 IF A$ = CHR$(20) THEN N$ =
    LEFT$(N$,LEN(N$) - 1)
240 IF A$ > CHR$(31) THEN N$ = N$
    + A$
250 GOTO 210
```

As Get routines go, this one is primitive, but it does support the backspace key, and it terminates properly when you press the return key. You could add extra lines to handle other special keys you wanted the routine to recognize.

Q: *I've noticed statement sequences like the following in some listings:*

```
20 GET C$:IF C$ THEN 20
30 IF F THEN PRINT
```

My question is, what does the value of C$ have to be to loop back to 20, and what does the value of F have to be to print?

C. M. Murray
St. John, Virgin Islands

A: Your line 20 is equivalent to:

```
20 GET C$:IF C$ > "" THEN 20
```

Similarly, your line 30 functions the same as:

```
30 IF F < > 0 THEN PRINT
```

In both cases, the comparison is with the null variable (zero for numbers and empty for strings). At heart, an If-Then statement is merely a test of whether the expression between the word IF and the word THEN evaluates to a Boolean true or false. If it evaluates to true, whatever follows the word THEN is executed next. If false, the program skips to the next line for its next instruction.

The shortcuts work because a null variable is evaluated as a Boolean false, and a non-null variable is evaluated as a Boolean true.■

Do you have a problem or question about your Commodore computer? Commodore Clinic can help. Just send your question on a postcard to:

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Queries are answered only through this column, and, due to the volume of mail, only questions that appeal to the majority of our readers can be published.

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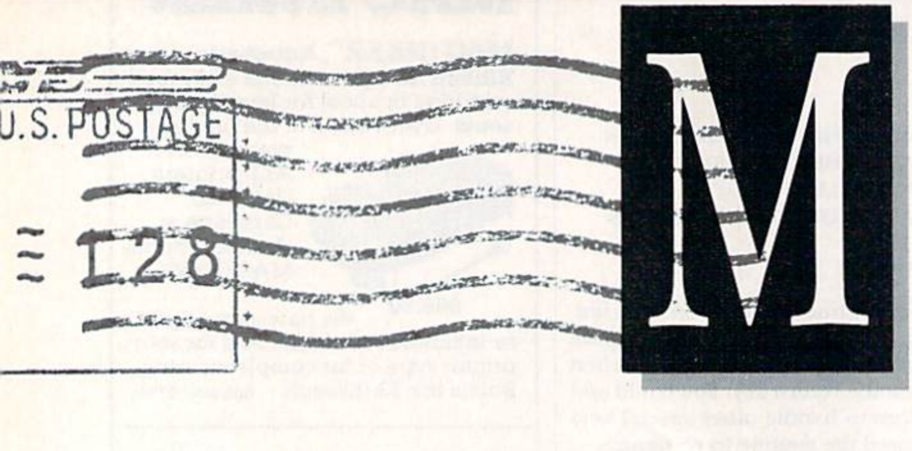

Hurray for the 128!

When I read the letters in last February's Mail RUN complaining about a lack of software for the C-128, I was puzzled by the writers' insistence that Commodore is not supporting this machine. Do they expect the same level of support for this relatively new computer that the C-64 now enjoys? It takes a large, installed base of computers to make it worthwhile for companies to develop supporting products.

If these writers got their 128s so they could play bigger and better games, I think they made an error in judgment. If they're looking for utilities, there are some really incredible ones for the 128 out there. CP/M also offers a large assortment of software that can be used on the 128, much of it in the public domain. For me, life with the C-128 is grand!

Steve Chambers
Wichita Falls, TX

I strongly disagree with the letters in recent Mail RUN columns complaining about the lack of software for the C-128. What kind of software do these people want? *RUN*, along with several other publications, includes articles and reviews for the 128 every month, as well as pages of ads. C-128 software is also available through user's groups and classified ads in the newspaper.

The 128 is a great machine. It's within most budgets, it's manufactured by a well-known company, and it has more technical and software support than most people could ever need.

Betty L. Edmunds
Hartland, MI

I keep reading letters bemoaning the lack of software for the C-128 and holding Commodore to blame. I don't know what kind of software the writers are looking for or where they're looking, but I can tell them there are excellent programs available that enable the 128 to do just about anything.

Here's a list of 128 programs I use: Word Writer 128, Data Manager 128 and SwiftCalc 128 from Timeworks; the Fleet System 3 word processor; the Sixth Sense telecommunications package and the Partner 128 desk accessory. There's also a variety of accounting packages available for this machine, plus computer-aided-design packages, compilers and scads of utilities.

Earl Burdick
Rockford, IL

It's hard to understand how anyone can think the C-128 lacks software support. Digital Solutions, as well as Timeworks and Batteries Included, have come out with word processors, database managers and spreadsheet programs that take advantage of the 128's features. If you have one good program of each kind, how many others do you need?

Also, the enhancements in Basic 7.0 that overcome Basic 2.0's difficulties with bit-mapped graphics and its inability to delete blocks of lines make 7.0 decidedly superior as a beginner's language. The only drawback I've found in the new version is that it makes the mistake of emulating IBM Basic's Renumber command, which is inadequate in not letting you specify a point in a program where renumbering should stop.

Charles Kluepfel
Bloomfield, NJ

We're glad to hear from readers who enjoy their C-128s as much as we do ours. Here at the RUN *editorial offices, we use 128s for all our word processing and data keeping (and an occasional game, of course).*

—Editors

ICT Data Chief Update

I'd like to mention some features of the Data Chief HFD-20 hard disk drive that weren't covered in *RUN*'s April 1987 review.

First is its ability to run CP/M when operating in single-sided mode with the C-128.

We've also made several important upgrades to the operating system and the user utilities. The current version of BOS-PAK, BOS 3.13, includes the preliminary ICT-Turbo utility that loads files eight times faster than the original version. (This speed-up utility will also be available soon in cartridge form so you can use the speedup with the 1541 and 1571 floppy drives, with or without the Data Chief.)

Finally, the utilities supplied with the Data Chief include a partition-to-partition copier that works within the stock hard drive and also supports file copying between two hard drives. (That is, when you add a second hard drive, it's supported by the same utilities.)

Bill Dodd
ICT, Inc.
Frederick, MD

Looking for Professional Letter Library

I'd like to purchase an original copy of Professional Letter Library, distributed by Pacific Coast Software and listed in *RUN*'s December 1984 Software Buyer's Guide. If anyone has this software and would like to sell it, or knows of another place I could get it, please drop me a line.

Charles Canamar
948 Willow Court
Hammond, IN 46320

RUN Award

During the year we've reviewed many software packages and now have chosen your disk called Productivity Pak II as the best productivity applications disk of 1986. We'd like to commend your company and employees for an outstanding product.

Carlos G. Groppa
Editor, *LaPrensa de Los Angeles*
Glendale, CA

The Superbase Saga Continues

Like other Mail RUN readers in previous months, I've been experiencing problems with Superbase 128 and the 1571 disk drive. I've tried three versions of the software and two different 1571s, one two years old and the other a brand new 1987 model. I not only get input/output error #5, but I must boot the program twice to get it to run! (I let it boot, then use control/Q to quit and restart.) I imagine the protection scheme is fouling the autostart. The manufacturer, Progressive Peripherals, has been cooperative but unable to help.

The most serious problem for me is being unable to have Superscript co-resident with Superbase, as Larry Penland mentioned doing in the March Mail RUN. I'm now using a Quicksilver interface and an old 8050 drive with excellent results. After getting the program running, I switch to the IEEE bus and everything works fine. However, I'd like to be using my 1571.

Does anyone know how to correct these problems? Also, I'd like to share applications programs, special uses, and so forth, with other Superbase users. It really does take good programming skill and knowledge to fully utilize this software.

M. Tucker Brawner
817 East 66th St.
Savannah, GA 31405

Partner 128 and PaperClip 128

I read the review of Timeworks' software package, Partner 128, in the December 1986 issue of *RUN*, and I'm interested in purchasing the program. However, I use Batteries Included's PaperClip 128 word processor extensively, and I'm not sure Partner 128 is compatible with it. First, are these two programs compatible? Second, because both PaperClip 128 and Partner 128 have to be connected by dongle and tail to joystick port 2, would they be operational if I used a Y adapter? Finally, if the Y adapter will work, where can I get one?

Frank C. Foster
Toronto, Ontario, Canada

Terry Fleming, Director of Customer Support for Timeworks, gave us the answers to your questions. Software Partner 128 is compatible with Batteries Included's PaperClip 128, and the combination will work when connected to your computer with a Y adapter. The Y adapter is available from Timeworks, 444 Lake Cook Road, Deerfield, IL 60015 for $9.95, plus $1.70 shipping and handling. For more information, call Timeworks at 312-948-9200, or their helpline at 312-948-9208.

—Editors

RUN Goes to School

It's difficult these days to find a magazine that addresses the educational interests of staff and students at the junior high level, but my staff feels they've found such a publication in *RUN*. We use the magazine in math class, with our gifted program, in the library for research, and copies are sent home for student enjoyment. It's truly a valuable educational tool.

Knute B. Momberg
Principal, Edwin Markham School
Placerville, CA

Armchair Pilot

Being an armchair ace, I read with interest Tim Walsh's article about flight simulators for the C-64 in last February's issue of *RUN*. There was, however, one glaring omission from the selection Mr. Walsh reviewed. Surely one of the most challenging "flight and fight" simulators for the 64 is Gunship, from MicroProse. For those who've mastered Strike Eagle, this program is the next logical challenge.

Gunship stretches the C-64 to the limits of its capabilities and begs to be converted to 128 mode. Infocom has apparently seen the light, coming out with some great 128 gameware, such as Trinity. Unfortunately, Trinity kicks the 1571 into 1541 mode, so booting it takes almost four minutes. It does take full advantage of the 80-column chip, though.

I think the time has come for software publishers to market more games for the C-128.

Roderic Don
Las Vegas, NV

A Call to Readers

This page is your stage, so stand up and say a few words. Extend praise, air grievances or offer hands-on advice and information.

Send your letters to Mail RUN, 80 Elm St., Peterborough, NH 03458. Each letter must include the writer's name and complete address. RUN *reserves the right to edit letters for style, clarity and space.* ■

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Compiled by HAROLD R. BJORNSEN

Enhance Your Graphics

The Graphics Transformer, a conversion and enhancement program for the C-64, converts graphics between most popular programs, including GEOS, ComputerEyes, Flexidraw, Doodle!, KoalaPad and The Print Shop. The program also converts between Hi-Res and Multicolor modes and converts any picture to a stand-alone, compressed, fast-loading and autobooting file. All options are menu-driven. It's available for $34.95 from Complete Data Information, 561 N. Main St., Yreka, CA 96097.

Check Reader Service number 400.

Make $ with Your 64/128

Money Machine magazine (Redwood Empire, PO Box 6609, San Mateo, CA 94403) is for C-64 and 128 owners who use their systems for small-business applications. Every issue reviews business-applications software and hardware and provides additional information on how to use your computer in business. The publication features tutorials on Superbase, publishes templates for spreadsheets and maintains a small-business forum on QuantumLink. The bimonthly magazine is available by subscription for one year ($16), two years ($28) and three years ($35).

Check Reader Service number 402.

Foil Terrorists on the High Seas

Electronic Arts (1820 Gateway Drive, San Mateo, CA 94404) has released PHM Pegasus, a naval-combat simulation game for the C-64 involving hydrofoil missile craft. Players complete a basic hydrofoil training session to become members of the terrorist action group force. Then, manning a hydrofoil armed with a cannon, chaff rockets, Harpoon or Exocet missiles and Gabriel missiles, they are sent on dangerous missions. An operator's manual details the simulation and finer points of naval hydro tactics. Priced at $39.95.

Check Reader Service number 405.

Bestow Recognition

AwardWare, an awards-generation program for the C-64, designs and prints customized certificates, awards, announcements, stationery and memos, as well as checks, coupons and tickets. The program's Award Disk option lets you design an award, copy it to another disk and send it to a friend. Available for $14.95 from Hi Tech Expressions, 2699 South Bayshore Drive, Suite 1000A, Coconut Grove, FL 33133.

Check Reader Service number 409.

Let them know they're special with certificates and awards from Hi Tech Expressions' AwardWare.

Wheel and Deal

There's no question that you can make money in stocks and bonds. Technical Analysis System 128, a charting and analysis package for stock market investors, can assist you by automatically updating your portfolio through Dow Jones News/Retrieval Service or Warner Computer Service. Or, you update your portfolio manually, if you wish. TAS-128 then draws charts and graphs to help you decide the "right" time to buy and sell your stocks or bonds. TAS-128 is available on disk for the C-128 for $59.95. Abacus Software, PO Box 7219, Grand Rapids, MI 49510.

Check Reader Service number 410.

Improve Your Monitor Screen

The Video Tune-Up program converts your C-64 into a full-function color-bar generator that generates all industry-standard video test patterns (cross-hatch, purity field, gray scale and color bars) and runs an animated video performance test. Tune-up instructions are included ($39.95). Bar Sweep converts your C-64 into a high-resolution bar-sweep pattern generator for determining the video response of your color monitor or television ($29.95). Available from Solas Products, PO Box 665, Spring House, PA 19477.

Check Reader Service number 406.

Four-Slot Expander

Aprospand-64, a four-slot expander for the C-64 and C-128, lets you install up to four cartridges and use them independently or in any combination allowed by the function of each cartridge ($33). Extender-64 is a ten-inch long ribbon cable that lets you move the Aprospand-64 to a more convenient location ($23). Aprotek, 1071-A Avenida Acaso, Camarillo, CA 93010.

Check Reader Service number 407.

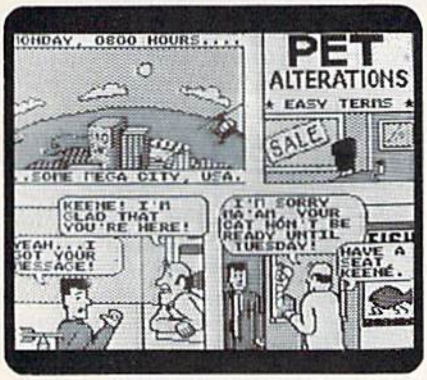
Draw Something Beautiful

Three-D Canvas, a C-128, disk-based graphics program that draws three-dimensional graphics, lets you create spheres, caves and typography. You can duplicate, animate, stretch and transfer 2- and 3-D drawings; fill with color or patterns in any of 16 colors; save drawings to disk and print them out; and bring your drawings to life with ready-made or custom sprites. Available for $49.95. An update to 3-D Canvas will be available soon for $69.95; registered owners may update their original copies for $10. Cappco, PO Box 7652, Chula Vista, CA 92021.

Check Reader Service number 412.

Direct a Comic Book

Accolade's Comics, an interactive comic book for the C-64, features two themes and dozens of major and minor story lines incorporating eight arcade-like games. The comic's hero, spy Steve Keene, works for the chief of Spystuff, Inc., to foil evil plots around the globe. You determine the direction of the story by selecting from a series of possible answers to questions asked of Keene; there's a different ending every time you play. Accolade's Comics comes from Accolade, 20833 Stevens Creek Blvd., Cupertino, CA 95014 and retails for $39.95.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Exercise Your Strategy

Strategic Simulations (1046 N. Rengstorff Ave., Mountain View, CA 94043) introduces two games on disks for the C-64.

In Gemstone Healer, the sequel to Gemstone Warrior, you must use resourcefulness, cunning and weapons to help you get the Healing Tools that will restore the damaged Gemstone. $29.95.

In Warship, a strategy wargame, you choose from 79 classes of warships from the Allied or Japanese fleet or modify ship data to create your own battleships, and you can devise original maps to create ship-to-ship tactical surface engagements. $59.95.

Check Reader Service number 417.

Disk-to-Disk Transfer

Central Coast Software (268 Bowie Drive, Los Osos, CA 93402) has released Disk-2-Disk, a transfer utility program for the C-64 and the Amiga with an Amiga model 1020 external 5¼-inch disk drive. It transfers C-64 sequential, relative and user files to the Amiga, formats 1541 and 1571 disks, runs under both the Intuition and CLI interfaces and provides duplicate filename detection with Query/Replace options. Disk-2-Disk is available for $49.95.

Check Reader Service number 403.

Cover Your Floor

Floor Essence, a floor-covering program from Floor Covering Systems (PO Box 421399-1399, Sacramento, CA 95842), figures any room dimension and displays the lineal footage of material to use in a room, including the fill-piece area. It figures room, material and waste areas in square feet and square yards, calculates seaming lengths, and saves records of the materials used, room sizes and roll sizes. Available for the C-64 for $79.95.

Check Reader Service number 401.

Write Something Beautiful

Professional Software (51 Fremont St., Needham, MA 02194) introduces Fleet System 4, an integrated writing tool for the C-128. It combines all the features found in Fleet System 3 (word processor, dictionary and thesaurus), plus RAM expansion, on-screen word wrap, general and context-sensitive help screens, an extra text area and the Fleet Filer database. Fleet System 4 is available on disk for $79.95.

Check Reader Service number 411.

Star-Studded Recipes

The Celebrity Cookbook, Volume 1, features gourmet recipes from Frank Sinatra, Bob Hope and Shirley MacLaine, among others. The disk includes a wine and bar guide and a bartender's guide, which calculates the exact amount of spirits to serve your guests. In addition, it lets you write your own cookbook. Available for the C-64 for $29.99. The Celebrity Series, 1625 S. Sunrise Way, Palm Springs, CA 92262.

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HOW TO TYPE *RUN* LISTINGS

To simplify typing *RUN*'s program listings, we include checksum numbers. These follow a REM statement at the end of each line (e.g., :REM*123) and necessitate your using *RUN*'s Perfect Typist programs, listed below.

Type in 64 Perfect Typist (Listing 1) for 64 programs, or 128 Perfect Typist (Listing 2) for 128-mode programs, and save it before running. When you want to type in a 64- or a 128-mode program, first load and run the appropriate Perfect Typist listing. Two SYS numbers appear on your screen. Jot them down, since you'll need them for deactivating and reactivating the checksum program.

If, when you run a Perfect Typist program, you get an "Out of Data error in line 30" in 64 Perfect Typist (or "in line 10" in the 128 version), it means you made an error in entering the data statements. Carefully compare what you typed with the data statements in the magazine. Correct any discrepancies, then re-save the corrected Perfect Typist program, and it should work well. (The reference to line 30—or 10—is irrelevant; that's not where the error is.)

After Perfect Typist has been loaded and run, start typing in the program listing from *RUN*. After you press the return key to log in each line, the checksum number, ranging from 0 to 255, appears below the line at the left margin.

If this matches the checksum printed in the listing after the :REM*, you have typed that line correctly. You then type the next line right over the previous line's checksum value. If the numbers do *not* agree, analyze the line on screen for errors. Make the needed changes and press return again to log them in. Compare the new checksum that appears with the magazine's number and then proceed.

When finished entering your program, disable the Perfect Typist by typing the appropriate SYS number and pressing return. Now you can save your program as usual, but before attempting to run it, turn the computer off and back on to completely clear out the Perfect Typist program.

You may save an incomplete program and continue it later. To do so, reload and run Perfect Typist, then load your program, list it, and go on from where you left off.

The 128 Perfect Typist works in either 40 or 80 columns and lets you use automatic line-numbering. If Auto is on, the checksum is printed below the line you just entered, and the next line number appears below the checksum.

All listings in *RUN* have been translated so the graphics and control characters become understandable key combinations. Follow instructions inside curly brackets. (What you see on screen looks quite different from what's inside the brackets.) For example, {SHIFT L} means hold down the shift key and press the L key. Another example is {22 SPACEs}, which instructs you to press the space bar 22 times. Ⓡ

Listing 1. *64 Perfect Typist program.*

```
1 REM 64 PERFECT TYPIST
2 REM BY: JAMES E BORDEN
10 POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
20 PG=PEEK(56):ML=PG*256+60
30 FORX=ML TO ML+154:READD:T=T+D:POKEX,D:N
   EXT
40 IFT<>16251 THEN PRINT"ERROR IN DATA..."
   :END
60 POKEML+4,PG:POKEML+10,PG:POKE ML+16,PG
70 POKE ML+20,PG:POKE ML+32,PG:POKE ML+38,
   PG
80 POKE ML+141,PG
89 PRINT"{SHFT CLR}{CRSR RT}**************
```

```
    ***********************"
90 SYS ML:PRINT "{CRSR RT}** 64 PERFECT TY
   PIST IS NOW ACTIVE{2 SPACEs}**"
100 PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACEs
    }SYS"ML+30"=OFF **"
101 PRINT"{CRSR RT}***********************
    ****************":NEW
110 DATA 173,005,003,201,003,208,001,096
120 DATA 141,105,003,173,004,003,141,104
130 DATA 003,162,103,160,003,142,004,003
140 DATA 140,005,003,096,234,234,173,104
150 DATA 003,141,004,003,173,105,003,141
160 DATA 005,003,096,032,124,165,132,011
170 DATA 162,000,142,240,003,142,241,003
180 DATA 189,000,002,240,051,201,032,208
190 DATA 004,164,212,240,040,201,034,208
200 DATA 008,072,165,212,073,001,133,212
210 DATA 104,072,238,241,003,173,241,003
220 DATA 041,007,168,104,024,072,024,104
230 DATA 016,001,056,042,136,016,246,109
240 DATA 240,003,141,240,003,232,208,200
250 DATA 173,240,003,024,101,020,024,101
260 DATA 021,141,240,003,169,042,032,210
270 DATA 255,169,000,174,240,003,032,205
280 DATA 189,162,003,189,211,003,032,210
290 DATA 255,202,016,247,164,011,096,145
300 DATA 013,032,032
```

Listing 2. *128 Perfect Typist program.*

```
1 REM 40/80 COL C128 PERFECT TYPIST
2 REM BY: JAMES E BORDEN
10 FORX=5120TO5379:READD:T=T+D:POKEX,D
20 NEXT:IFT<>28312 THENPRINT"{2 CRSR DNs}E
   RROR IN DATA...":END
25 A$="":IFPEEK(215) THENA$="{20 SPACEs}"
30 PRINT"{SHFT CLR}"A$" ******************
   ********************"
40 PRINTA$" ** 128 PERFECT TYPIST IS NOW A
   CTIVE **"
50 PRINTA$" **{2 SPACEs}SYS 5120=ON{7 SPAC
   Es}SYS 5150=OFF{2 SPACEs}**"
60 PRINTA$" ******************************
   ********":SYS5120:NEW
70 DATA 173,5,3,201,20,208,1,96,141,45,20,
   173,4,3,141,44,20,162,43,160,20
80 DATA 142,4,3,140,5,3,96,234,234,173,44,
   20,141,4,3,173,45,20,141,5,3,96
90 DATA 32,13,67,140,255,19,162,0,142,252,
   19,142,253,19,142,254,19,189,0,2
100 DATA 201,32,240,8,201,48,144,7,201,58,
    176,3,232,208,238,189,0,2,240,54
110 DATA 201,32,208,5,172,254,19,240,42,20
    1,34,208,10,72,173,254,19,73,1
120 DATA 141,254,19,104,72,238,253,19,173,
    253,19,41,7,168,104,24,72,24,104
130 DATA 16,1,56,42,136,16,246,109,252,19,
    141,252,19,232,208,197,173,252
140 DATA 19,24,101,22,24,101,23,141,252,19
    ,169,42,32,241,20,32,188,20,160
150 DATA 2,185,185,20,32,241,20,136,16,247
    ,165,116,208,9,165,117,208,5,169
160 DATA 145,32,241,20,172,255,19,96,13,32
    ,32,162,0,173,252,19,232,56,233
170 DATA 100,176,250,105,100,202,240,3,32,
    232,20,201,10,176,5,205,252,19
180 DATA 240,15,162,0,232,56,233,10,16,250
    ,24,105,10,202,32,232,20,170,72
190 DATA 138,9,48,32,241,20,104,96,170,173
    ,0,255,72,169,0,141,0,255,138,32
200 DATA 210,255,104,141,0,255,96
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■

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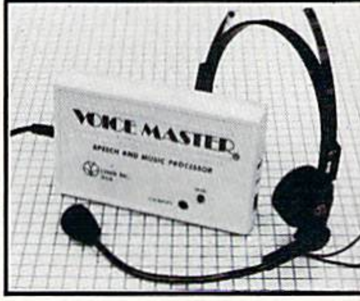

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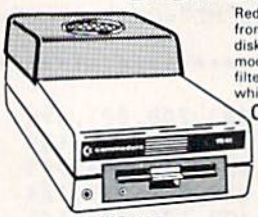

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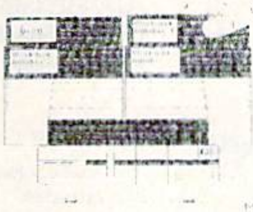

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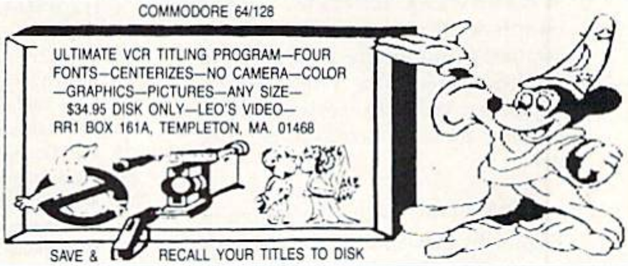

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● **HARDWARE REVIEWS**—Next month we'll also assess two long-awaited Commodore products: the 1351 mouse and the 1764 memory expander. We'll also review a sleek-looking, new 1571-compatible disk drive.

● **MIDI**—The Musical Instrument Digital Interface, a technology for connecting digital instruments to each other and to computers, is expanding the creative horizons of professional and amateur musicians alike. Commodores are part of this exciting musical scene, and in our July issue we'll tell you all about it.

● **PROGRAMS GALORE**—No issue of *RUN* would be complete without an assortment of useful applications programs. The lineup for next month will include a flash card program youngsters can use to review school subjects; a routine for adding pie charts to our popular Ultra Hi-Res Graphics program; a shopping list program to make your visits to the supermarket fast and efficient; a Basic program that adds an append command to the C-128; and more!

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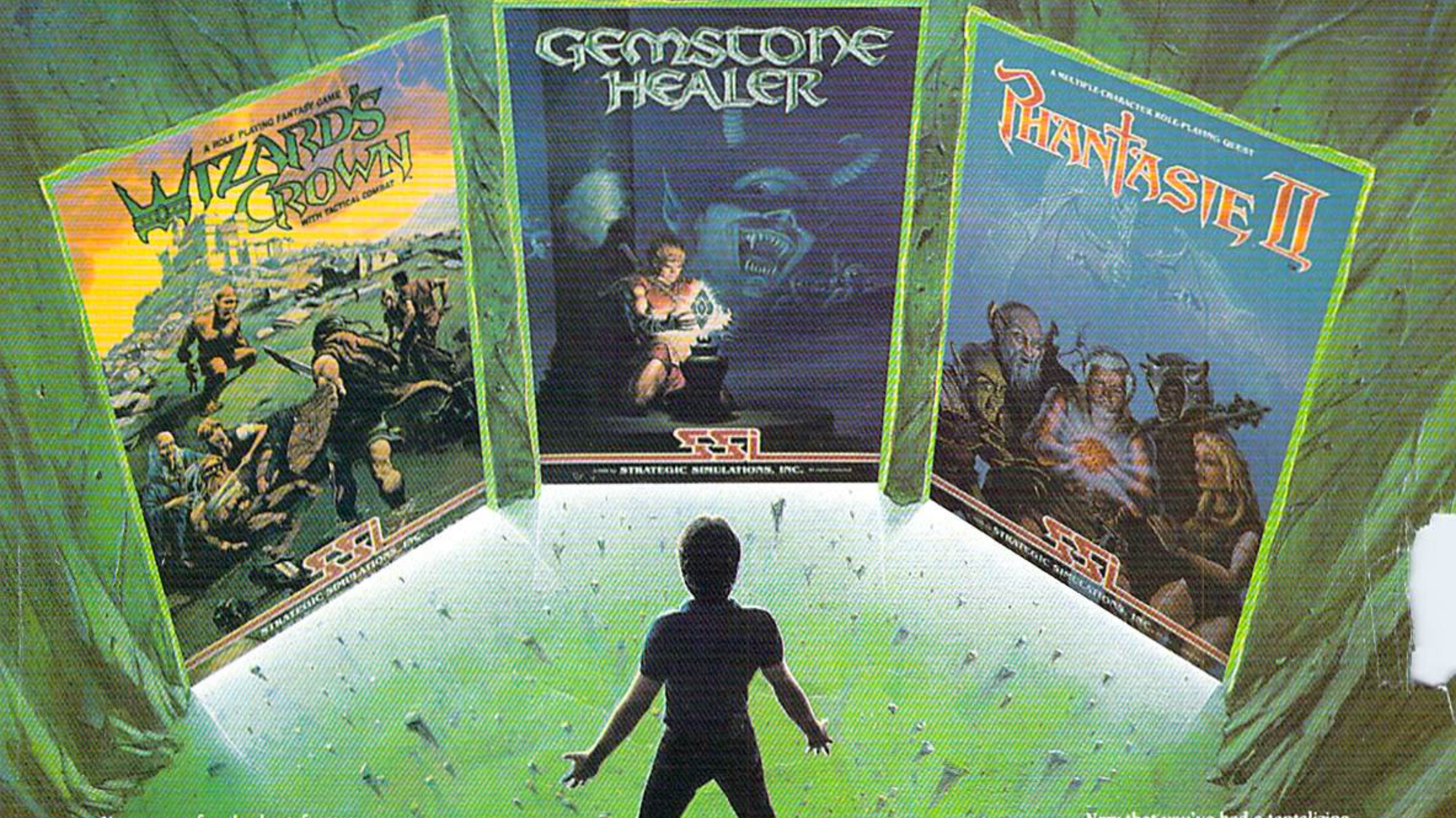
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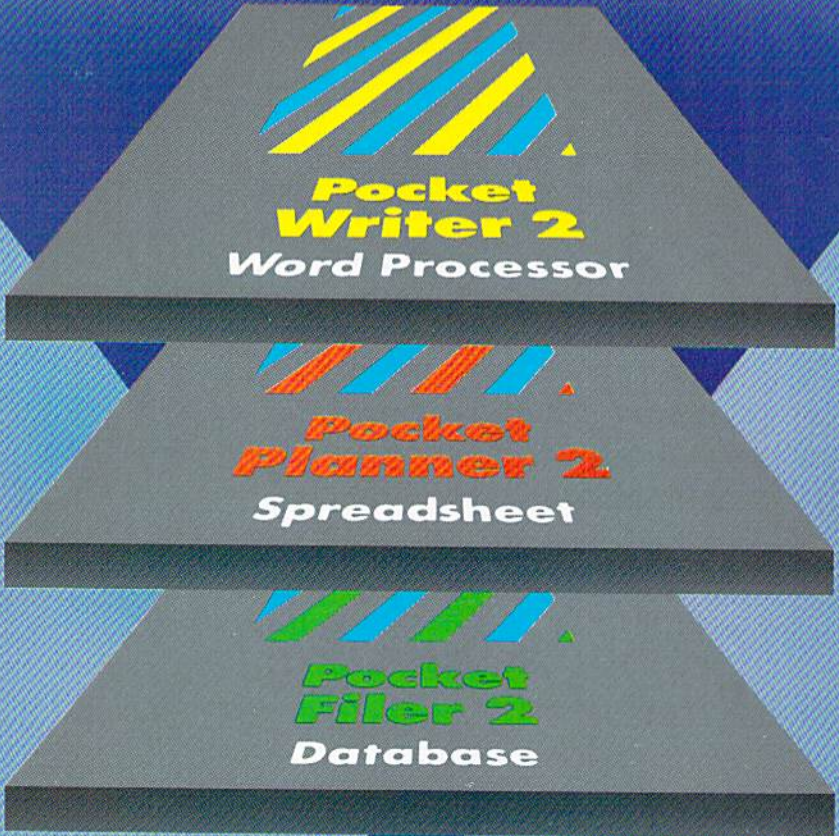

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